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WHAT SHOULD MEDICARE PAY FOR SURGICAL PROCEDURES?

PB86-215605

RESEARCH REPORT

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TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

1.1 Objective of the Study 1-1
1.2 Summary of Findings 1-2
1.3 Data Sources and Methods 1-8
1.3.1 Selection of Study States 1-8
1.3.2 Editing Medicare Part B Claims Data 1-2
1.3.3 Construction of Analytic Files 1-9
1.4 Overview of the Report 1-15

2.0 WHERE DOES THE PART B DOLLAR GO? 2-1

2.1 Part B Expenditures by Type of Service, Location and Specialty 2-1
2.2 High Dollar, High Volume Procedures by Specialty 2-5
2.3 Unequal Distribution of Medicare Revenues 2-11
2.4 Physician Practice Dependence on High Dollar, High Volume Procedures 2-15

3.0 LENS PROCEDURES 3-1

3.1 Clinical Overview 3-1
3.1.1 Related Technologies 3-1
3.1.2 Surgical Procedure 3-2
3.1.3 Clinical Indications and Success 3-2
3.2 What Kind of Lens Operations are Performed and Where? 3-3
3.3 What Do Lens Procedures Cost? 3-5
3.4 What Services Are Associated With Lens Procedures 3-7

4.0 CORONARY ARTERY BYPASS GRAFTS (CABGs) 4-1

4.1 Clinical Overview 4-1
4.1.1 Clinical Indications for Coronary Artery Bypass Graft Surgery 4-1
4.1.2 Surgical Procedure 4-1
4.1.3 Success of CABGs 4-2
4.2 Overview of CABG Procedures in Sample States 4-2
4.2.1 Physician Bills for CABGs 4-5
4.3 Reasonable Charge Levels for CABGs 4-8
4.4 The Impact of Major Procedures on the Charges for CABGs 4-12

5.0 PERMANENT PACEMAKER INSERTIONS 5-1

5.1 Overview 5-1
5.2 Clinical Indications for Permanent Pacemaker Insertion 5-2
5.2.1 Pacemaker Technology 5-2
5.2.2 Insertion Procedure 5-3
5.3 Comparison of Medicare Allowed Charges for Pacemaker Insertion 5-4
5.4 Use of Different Types of Pacemakers 5-6
5.5 Comparison of Utilization of Related Services 5-8
5.6 Explaining the Variation in Medicare Allowed Charges 5-13
5.7 Potential for "Packaging" Pacemakers 5-17

6.0 WHAT SHOULD MEDICARE PAY FOR SURGICAL PROCEDURES? 6-1

6.1 Measuring "Comparable Worth" in Surgery 6-1
6.2 Potential Medicare Payments Under a Resource-Based RVS 6-3
6.3 Sensitivity of RBRVS Payments to the Choice of Index Procedure 6-6
6.4 Payments Based on Specialty-Specific RBRVS 6-8
6.5 Implications for Medicare Payment Reform 6-11

APPENDIX A A 1

APPENDIX B B-1

REFERENCES

TABLE OF TABLES

TABLE 1-1	COMPARISONS OF CURRENT MEDICARE CHARGES AND POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS	1-4
TABLE 1-2	TOTAL NUMBER OF PHYSICIAN PRACTICES BILLING MEDICARE BY SPECIALTY	1-11
TABLE 1-3	SAMPLE SIZES FOR SURGICAL PROCEDURE FILES	1-13
TABLE 2-1	DISTRIBUTION OF TOTAL MEDICARE PHYSICIAN EXPENDITURES BY TYPES OF SERVICE	2-2
TABLE 2-2	DISTRIBUTION OF TOTAL MEDICARE PHYSICIAN EXPENDITURES BY LOCATION	2-3
TABLE 2-3	DISTRIBUTION OF TOTAL MEDICARE PHYSICIAN EXPENDITURES BY PRACTICE SPECIALTY	2-4
TABLE 2-4	WHAT DO OPHTHALMOLOGISTS DO? (Percent of Medicare Revenues)	2-6
TABLE 2-5	AVERAGE MEDICARE ALLOWED CHARGES FOR HIGH VOLUME SURGICAL PROCEDURES	2-7
TABLE 2-6	WHAT DO UROLOGISTS DO? (Percent of Medicare Revenues)	2-10
TABLE 2-7	WHAT DO GENERAL SURGEONS DO? (Percent of Medicare Revenues)	2-12
TABLE 2-8	DISTRIBUTION OF TOTAL PART B REVENUES ACROSS ALL MEDICARE PRACTICES	2-13
TABLE 2-9	PERCENT OF MEDICARE REVENUES EARNED BY TOP 10% AND BOTTOM 50% OF PHYSICIAN PRACTICES BY SPECIALTY	2-14
TABLE 2-10	MEDICARE DEPENDENCE OF OPHTHALMOLOGY PRACTICES PERFORMING LENS PROCEDURES	2-16
TABLE 2-11	MEDICARE DEPENDENCE OF THORACIC SURGERY PRACTICES PERFORMING CABGs	2-16
TABLE 2-12	MEDICARE DEPENDENCE OF PHYSICIAN PRACTICES INSERTING PACEMAKERS	2-18
TABLE 3-1	PROCEDURE MIX OF LENS OPERATIONS	3-4
TABLE 3-2	LOCATION OF LENS OPERATIONS	3-4
TABLE 3-3	AVERAGE MEDICARE REASONABLE CHARGES FOR LENS PROCEDURES (CVs in parentheses)	3-6

TABLE 3-4	MEDICARE REASONABLE CHARGES BY WISCONSIN LOCALITY FOR LENS EXTRACTION WITH IOL INSERTION (One-Stage Procedure)	3-8
TABLE 3-5	PACKAGE SERVICES FOR ONE-STAGE LENS PROCEDURES	3-9
TABLE 4-1	DISTRIBUTION OF CABGs BY PRACTICE AND SPECIALTY	4-3
TABLE 4-2	PHYSICIAN BILLS FOR CABGs	4-6
TABLE 4-3	AVERAGE REASONABLE CHARGES FOR CABGs WITHOUT OTHER MAJOR OPERATION	4-9
TABLE 4-4	AVERAGE REASONABLE CABG CHARGES FOR THORACIC SURGERY PRACTICES, WISCONSIN (CABGs without other major procedures and without modifiers only)	4-11
TABLE 4-5	THE IMPACT OF OTHER MAJOR PROCEDURES ON CABG CHARGES	4-13
TABLE 5-1	DISTRIBUTION OF MEDICARE ALLOWED CHARGES FOR PACEMAKER INSERTION-ALABAMA AND WISCONSIN 1984	5-5
TABLE 5-2	DISTRIBUTION OF TYPE OF PACEMAKER ACROSS ALL SPECIALTIES	5-7
TABLE 5-3	COMPARISON OF UTILIZATION OF INPATIENT SERVICES RELATED TO PACEMAKER INSERTION-ALABAMA	5-9
TABLE 5-4	COMPARISON OF UTILIZATION OF INPATIENT SERVICES RELATED TO PACEMAKER INSERTION-WISCONSIN	5-10
TABLE 5-5	COMPARISON OF EFFECTS OF SPECIALTY AND TYPE OF PACEMAKER ON MEDICARE ALLOWED CHARGES	5-14
TABLE 5-6	EFFECT OF REASONABLE CHARGE LOCALITY (RCL) ON MEDICARE ALLOWED CHARGES	5-16
TABLE 5-7	COMPARISON OF TOTAL PACKAGE COSTS FOR PACEMAKER INSERTION BY SPECIALTY	5-18
TABLE 6-1	COMPARISONS OF CURRENT MEDICARE CHARGES AND POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS	6-4
TABLE 6-2	SENSITIVITY OF RESOURCE-BASED PAYMENTS TO CHOICE OF INDEX PROCEDURE	6-7
TABLE 6-3	POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR ORTHOPEDIC SURGEONS	6-10
TABLE 6-4	POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR THORACIC SURGEONS	6-12
TABLE 6-5	POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR UROLOGISTS	6-13

TABLE 6-6 POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR OPHTHALMOLOGISTS 6-14

TABLE A-1 WHAT DO CARDIOLOGISTS DO? (Percent of Medicare Revenues) A-1

TABLE A-2 WHAT DO GENERAL AND FAMILY PRACTITIONERS DO? (Percent of Medicare Revenues) A-2

TABLE A-3 WHAT DO INTERNISTS DO? (Percent of Medicare Revenues) A-3

TABLE A-4 WHAT DO ORTHOPEDIC SURGEONS DO? (Percent of Medicare Revenues) A-4

TABLE A-5 WHAT DO THORACIC SURGEONS DO? (Percent of Medicare Revenues) A-5

TABLE B-1 MEDICARE DEPENDENCE OF CARDIOLOGY PRACTICES PERFORMING CARDIAC CATHETERIZATIONS B-1

TABLE B-2 MEDICARE DEPENDENCE OF ORTHOPEDIC SURGERY PRACTICES PERFORMING TOTAL HIP REPLACEMENTS B-1

TABLE B-3 MEDICARE DEPENDENCE OF UROLOGY PRACTICES PERFORMING PROSTATECTOMIES B-2

LIST OF FIGURES

FIGURE 1-1 PERCENT CHANGE IN MEDICARE PAYMENTS UNDER A RESOURCE BASED RVS FOR THORACIC SURGEONS 1-6

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

1.1 Objectives of the Study

Federal policy makers have proposed to reduce Medicare payment for certain surgical procedures that are believed to be "overpriced." Three procedures have been selected for initial review by Part B carriers: coronary artery bypass graft (CABG) surgery, lens procedures, and permanent pacemaker insertions. Technological changes are believed to have greatly reduced the time inputs and other physician costs associated with these procedures. The purpose of this preliminary report is to examine these and other "high volume, high dollar" Medicare surgeries. Specifically, the following kinds of questions are addressed:

- What are Medicare reasonable charges for high volume procedures?
- How dependent are individual physician practices on these high volume procedures? What percent of their total Medicare revenues do these procedures represent? How does Medicare dependence vary by specialty?
- What is the distribution of high volume surgery within a specialty? Do all thoracic surgeons perform CABGs, for example, or are the bulk of procedures concentrated within a few practices?
- What is the extent of "hidden charges" for these surgical procedures? Is effective reimbursement for some operations even higher because of billings from more than one surgeon?
- How do we know a given procedure is "overpriced"? How can we determine the "comparable worth" of surgical operations?

These issues and many others are analyzed in the subsequent chapters. A summary of our primary results is presented in the next section.

1.2 Summary of Findings

Our analysis of Medicare payments for surgical procedures was based on 1984 Medicare Part B claims from four states: Alabama, Connecticut, Washington, and Wisconsin. These states were selected because, among other reasons, they represent the four major geographic regions and because all use CPT-4 procedure coding.

Although a range of physician specialties and surgical procedures were examined, special attention was focused on coronary artery bypass graft (CABG) surgery, lens procedures, and permanent pacemaker insertions. As expected, Medicare reasonable charges for these procedures varied by specialty and by locality. What was suprising, however, was the extent of "hidden" surgical charges. Analysis of the primary surgeon's charge alone tended to underestimate total surgical charges for the operation. Often these "hidden" charges consisted of bills from assistant surgeons, but sometimes they appeared as a bill from a second surgeon (that might or might not have had a modifier indicating a surgical "team" approach). Unpackaging of the procedure itself was found for pacemakers, in which some surgeons were paid to create the "pocket" to accomodate the device while cardiologists were paid separately for inserting the electrodes. Total charges were invariably higher than when a single physician performed the entire procedure.

These analyses of current billing and practice patterns, however, can not answer the fundamental question: How do we know that payment levels for surgery are, in fact, too high? In order to establish the "comparable worth" of different surgical procedures, we used the Resource-Based Relative Value Scale (RBRVS) developed by Hsaio and Stason. This scale assigns a value to each operation based on the resource costs involved in performing the procedure including the surgeon's time, complexity, practice costs, and a return to specialty training.

How valid is the Resource-Based RVS for purposes of our study? The values are based on estimates provided by a relatively small number of physicians (110), all located within Massachusetts. The single state location of study physicians will bias the results only if we believe that operating room times or perceived complexity are different in Massachusetts than in other parts of the country. There is no reason to believe this is the case,

although certainly national data would be preferable. More important is the number of study physicians; larger sample sizes (particularly within specialty) would give us more confidence in the stability of the time and complexity estimates. Despite these very real limitations, the Resource-Based RVS can provide useful guidance on the "comparable worth" of different surgical procedures.

Table 1-1 compares 1984 Medicare reasonable charges for 31 surgical procedures with what their payments would be under the Resource-Based RVS. Reasonable charges based on a weighted average for all operations in our four states are displayed in column 1. The second column displays the relative values from the Hsaio RBRVS study. To transform reasonable charges into payments reflecting the actual resources involved, we selected one procedure (cholecystectomy) to serve as the base or index value. These resource-based payments are shown in column 3, while the fourth column displays the percent change in Medicare reimbursement that would result.

Relative to cholecystectomy, all but six of the surgical procedures on Table 1-1 are significantly "overpaid". Under a resource-based approach, allowed charge levels for pacemaker insertion would be reduced by 39 percent, coronary artery bypass graft surgery by 33 percent, and one-stage lens procedures by 63 percent. "Roll-backs" of similar magnitude would take place for other high volume, high dollar Medicare procedures. Total hip replacements would be paid 45 percent less than currently, and transurethral resections of the prostate 36 percent less.

Calculation of these resource-based payments are quite sensitive to the surgical procedure selected as the index, however. While the use of lung lobectomy as an index procedure would produce resource-based payments virtually identical to those based on cholecystectomy, the use of hernia repair as the index results in somewhat less drastic changes from current Medicare reimbursement. Pacemakers would be paid "only" 17 percent less, for example, CABGs 9 percent less, and one-stage lens procedures 50 percent less.

Regardless of which surgical procedure is used as an index, the absolute magnitude of potential payment changes are still probably underestimated. Our approach assumes that reimbursement for the base procedure is reasonable given the time, skill, etc., required to perform it. However, many researchers

TABLE 1-1

COMPARISONS OF CURRENT MEDICARE CHARGES AND POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS

	Medicare Reasonable Charge[a]	RBRVS Value[b]	Resource-Based Payment[c]	Percent Change
Cholecystectomy (index procedure)	$704	2.01	$704	0.0%
Diagnostic colonoscopy	278	0.73	256	-7.9
Inguinal hernia repair	465	0.98	343	-26.2
Tracheostomy	288	0.83	291	+1.0
Modified radical mastectomy	876	2.56	897	+2.4
Esophogogastrectomy	1,727	6.01	2,105	+21.9
Total abdominal hysterectomy	825	1.88	658	-20.2
Diagnostic D & C	222	0.48	168	-24.3
Laparoscopy	362	0.63	221	-39.0
Diagnostic cystourethroscopy	87	0.25	88	+1.1
Transurethral resection of medium bladder tumor	600	1.04	364	-39.3
Ureterolithotomy	923	2.09	732	-20.7
Total cystectomy with urinary diversion	1,695	8.63	3,023	+78.3
Transurethral resection of the prostate	1,013	1.85	648	-36.0
Suprapubic prostatectomy	1,086	2.05	718	-33.9
Total hip replacement	2,040	3.21	1,124	-44.9
Decompression of carpal tunnel	440	0.72	252	-42.7
Reduction of wrist fracture	277	0.79	277	0.0
Femoral fracture with open treatment & internal fixation	1,105	2.75	963	-12.9
Lumbar laminectomy	1,400	2.04	715	-48.9
Permanent pacemaker insertion	854	1.49	522	-38.9
Lung Lobectomy	1,428	4.16	1,457	+2.0
Insertion of intra-aortic balloon pump	433	1.02	357	-17.6
Mitral valve replacement	2,702	6.52	2,284	-15.5
Coronary artery bypass graft, three arteries	3,666	7.05	2,469	-32.7
Peripheral iridectomy for glaucoma	561	0.74	259	-53.8
Laser photocoagulation for retinopathy	499	0.79	277	-44.5
Lens extraction, intracapsular	987	1.37	480	-51.4
Extraction with intraocular lens insertion (one-stage procedure)	1,444	1.51[d]	529	-63.4
Intraocular lens insertion only	939	1.36	476	-49.3
Scleral buckling for retinal detachment	1,403	2.43	851	-39.3

[a] Average charges calculated with 1984 Part B claims from Alabama, Connecticut, Washington and Wisconsin.

[b] Obtained from Hsiao et al., 1985.

[c] Estimates based on formula: $704*(RBRVS/2.01).

[d] Estimate derived by authors, extrapolating from the RBRVS value for lens extraction alone.

including Hsaio-Stason, have argued that virtually all surgical procedures are overpaid relative to nonsurgical procedures (i.e., the so-called "cognitive services"). If so, then our estimates of potential RBRVS payments are conservative and the percent changes are underestimated.

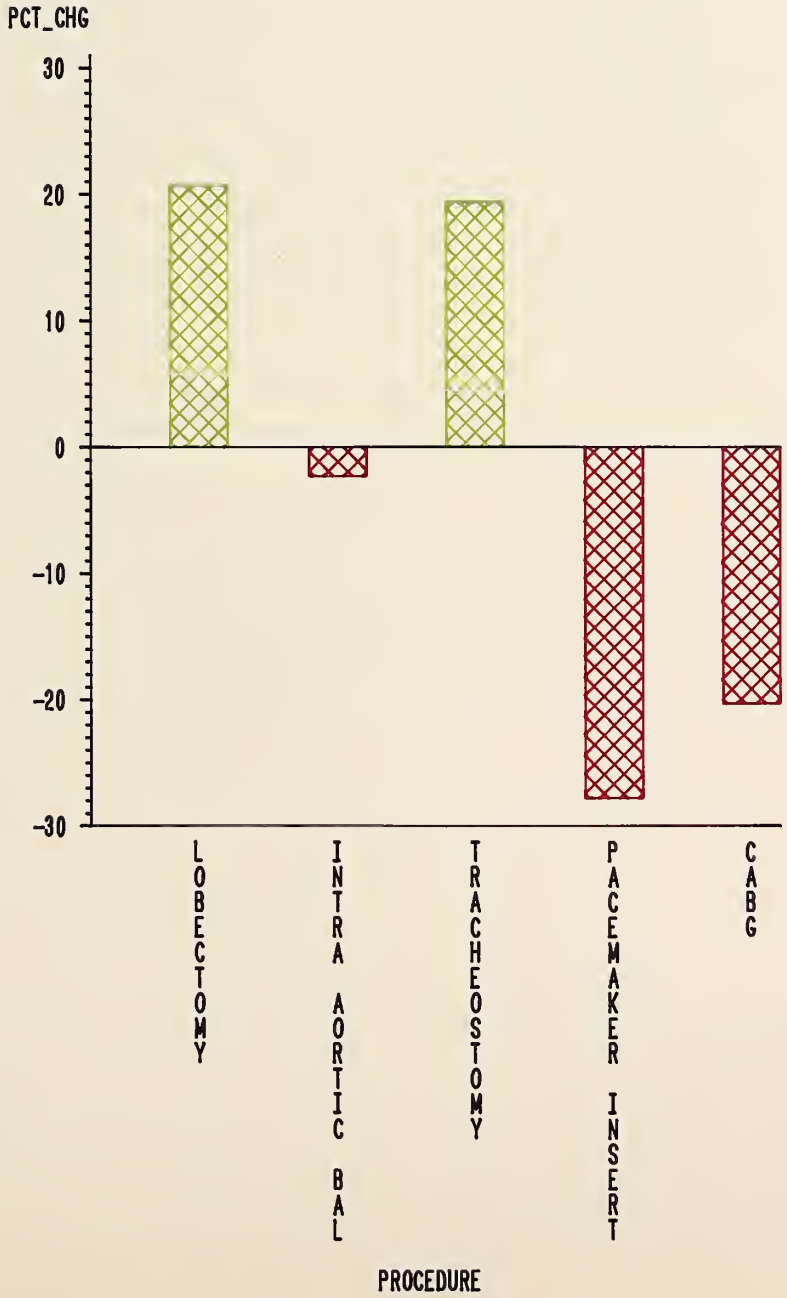
One potential criticism of the RBRVS in its current state of development is the cross-procedure comparability of estimates provided by physicians in different specialties. To eliminate this potential source of bias, we analyzed potential resource-based payments for individual surgical specialties, using one of that specialty's procedures as the index. Problems with comparability of surgical operations should be minimized when all estimates are derived from the same physicians in the same specialty.

Figure 1-1 displays the percent change in Medicare payments for thoracic surgery procedures, based on mitral valve replacement (an open-heart operation of long-standing) as the index procedure. Relative to mitral valve replacement, it is the high volume Medicare operations that appear to be most "overpaid." Under this resource-based approach, Medicare payments for pacemaker insertion should be reduced 28 percent and CABG surgery by 20 percent. Current reimbursement levels for insertion of intra-aortic ballon pump seen about right, on the other hand, while lung lobectomy and tracheostomy should be paid more.

Similar results were found for orthopedic surgeons, urologists, and ophthalmologists. Even when compared to specialty-specific index procedures, the most frequent Medicare procedures always appear to be substantially "overpaid", i.e., total hip replacements, prostatectomies, and lens procedures. Although we have studied only a subset of procedures, the 31 procedures shown in Table 1-1 account for over one-fourth of all surgical operations performed on the elderly (NCHS, 1985). Thus, reducing Medicare payments for even some of these operations could produce considerable cost savings. Before implementing such a reimbursement change, however, policymakers should consider two factors. First, while our results strongly suggest that Medicare is paying far more for many surgeries than their resource costs would justify, these analyses should be considered preliminary. More work is needed with an RBRVS based on a larger national sample, and the selection of an appropriate index procedure also needs to be carefully evaluated. Second, so long as physicians may continue to refuse assignment, these potential physician payment reductions will be passed on to

FIGURE 1-1

PERCENT CHANGE IN MEDICARE PAYMENTS UNDER A RESOURCE-BASED RVS FOR THORACIC SURGEONS



NOTE: BASED ON MITRAL VALVE REPLACEMENT AS THE INDEX

beneficiaries in the form of higher out-of-pocket liability. Beneficiary protection might be achieved through (1) greater incentives for physicians to sign the Medicare participation agreement; or (2) a Preferred Provider arrangement in which beneficiaries are covered only when treated by physicians willing to accept the Medicare fee as payment-in-full.

1.3 Data Sources and Methods

1.3.1 Selection of Study States

The empirical analysis evaluates 1984 Medicare Part B claims data for four states: Alabama, Connecticut, Washington, and Wisconsin. The claims contain information on all services and supplies provided to beneficiaries under the Supplementary Medical Insurance (SMI) portion of Medicare, known as Part B. These states were chosen to represent the four major geographic regions and to demonstrate a range of participation rates in the Medicare Participating Physician Program. Alabama has one of the highest participation rates in the country (54%), while Connecticut's rate of 23 percent is well below the first year (FY 1985) national average of 30 percent. Washington physicians signed up at rates below that for U.S. physicians as a whole (27%), while Wisconsin physicians were somewhat above average (35%). More importantly these states were selected because, by 1984, their carriers had converted to the uniform Medicare coding system for procedures, HCPCS, a slightly modified version of CPT-4.

Since this study is concerned with physician services only, a considerable amount of editing of the raw claims files was done. Section 1.3.2 briefly describes this editing process. Once the claims were edited, two types of analytic files were created. The first uses the physician practice as the unit of analysis in order to generate expenditure and volume estimates by specialty, type of service, location, and procedure. The second type of analytic file was created by aggregating claims to the hospital admission or beneficiary level so that certain "high dollar, high volume" surgical procedures could be investigated in more detail. Section 1.3.3 details the construction of the two types of analytic files.

1.3.2 Editing Medicare Part B Claims Data

The initial screens of raw claims are as follows. First, claims from non-physicians (including independent labs) and limited-license practitioners (e.g., podiatrists, chiropractors and oral surgeons) were excluded. Second, claims for supplies, injections, immunizations, and durable medical equipment were eliminated because our analysis is focussed on procedures and services billed by physicians. Third, we also excluded claims which were denied by the carrier, for whatever reason.

A second series of screens was necessary to adjust claims for any modifications and duplications. Modifiers have been incorporated within CPT-4 to identify services that have been altered. However, we found that often the modifiers have been used incorrectly requiring some recoding of the claims data. Some CPT-4 codes include both a technical and professional component. We found frequent use of the modifier 26, indicating that the physician is billing for the professional component only. A common example we found was CPT-4 proc. 93000, Electrocardiogram (ECG) with interpretation and report that was billed with the modifier 26 indicating interpretation only, rather than CPT-4 93010 which is for ECG interpretation and report only.

Duplicate claims were also identified and eliminated. This involved sorting claims by provider ID, HIC number, date of service, location, type of service, and procedure. Once sorted, we identified and deleted claims that were exact duplicates. If, for example, we identified two claims from one physician for a cholecystectomy on a patient on the same day, with the same allowed charges, one claim was dropped. If the HIC number, date of service, procedure and provider were the same, and the claim is identified as an adjustment, we added the dollar amounts and eliminated one claim.

These screens reduced the number of raw claims to the following: 5.7 million in Alabama, 3.8 million in Connecticut, 5.5 million in Washington, and 6.9 million in Washington.

1.3.3 Construction of Analytic Files

Analysis of these Medicare Part B claims was conducted in two parts. First, we examined them with the provider as the unit of observation for which we included data on all four states. In the second, we created analytic files using the procedure or the beneficiary as the unit of analysis. For purposes of this report, we restricted the second analysis to two states, Alabama and Wisconsin, because of the time and resources necessary to understand carrier procedure. We will extend our analysis of these surgical procedures to the remaining two states in the next few months.

Practice Aggregate Files

The practice aggregates were created by aggregating all claims with the same Medicare provider ID number. To the extent that group physicians share a provider ID, we underestimate the number of unique physicians. This yielded between 3,900-5,600 practices in each state. Table 1-2 presents the total number of practices by state and specialty. This table represents the total number of practices billing Medicare and not necessarily the entire supply of practices.

In constructing the practice aggregates, the following data elements were available for each practice:

- provider ID;
- specialty;
- sum of submitted charges;
- sum of allowed charges;
- sum of allowed charges based on actual, customary, and prevailing charges;
- sum of allowed charges by type of assignment, type of service, and location;
- submitted, allowed, and assigned charges for office visits, hospital and ER visits, and consultations; and
- number of office, ER and hospital visits, and consultations.

All data on visits and consultations were retained at the individual procedure code level. In addition, detailed information on high volume-high dollar procedures for each specialty was preserved. The number of procedures retained ranged from eight for allergists and psychiatrists to over thirty for anesthesiologists. The analytic file contains total submitted, allowed, and assigned charges for each procedure as well as the number of these procedures performed by each unique practice. This detail enabled us to analyze expenditures for high volume-high dollar procedures, practice dependence on these procedures, and their relationship to total Medicare expenditures. Chapter 2 highlights the findings using the practice aggregate files.

TABLE 1-2

TOTAL NUMBER OF PHYSICIAN PRACTICES BILLING MEDICARE BY SPECIALTY

SPECIALTY	ALABAMA	CONNECTICUT	WASHINGTON	WISCONSIN
General Practitioners	683	329	1,021	440
Family Practitioners	486	145	364	771
Internists	614	809	745	954
Allergists	11	46	29	36
Cardiologists	114	133	98	121
Dermatologists	80	98	100	107
Gastroenterologists	56	68	37	38
Nephrologists	43	30	26	9
Pediatricians	99	65	66	189
Pulm. Dis. Specialists	49	53	33	18
General Surgeons	372	327	328	446
Neurosurgeons	46	44	53	44
OB/GYNs	282	358	263	318
Ophthalmologists	134	192	202	236
Orthopedic Surgeons	131	183	236	255
Otolaryngologists	106	109	106	124
Plastic Surgeons	27	42	70	42
Thoracic Surgeons	48	19	25	51
Urologists	85	82	112	109
Anesthesiologists	85	41	232	287
Pathologists	44	11	58	128
Radiologists	150	110	173	216
Multi-Specialty Groups	15	51	125	265
Neurologists	79	67	85	102
Psychiatrists	130	453	331	284
Other Specialists	18	57	99	47
Total	3,987	3,922	5,017	5,637

Source: Medicare Part B claims data, 1984.

Surgical Procedure Files

While the practice aggregate files furnish the background statistics for this study, we are also interested in evaluating several high volume, high dollar Medicare procedures. There has been recent debate as to whether or not new technologies in the treatment of cataracts, coronary artery disease, and cardiac arrhythmia have warranted the expenditures by Medicare for lens procedures, coronary artery bypass grafts, and pacemaker insertions, respectively. To look at these surgical procedures more closely, we aggregated all physician claims for pacemaker and CABG patients based on the hospital admission for the surgery as the unit of analysis. For lens procedures, which are sometimes done on an outpatient basis, the beneficiary is the unit of analysis. Table 1-3 presents the actual number of cases for two states: Alabama and Wisconsin. The following types of information were extracted from the claims data for analysis:

- patient ID (HIC Number);
- attending physician ID (i.e., the physician who performed the surgical procedure);
- total submitted and assigned charges for inpatient services (e.g., visits, consultations, radiology, surgery);
- specialty and provider IDs for physicians performing inpatient services; and
- total number of inpatient services by type of service.

In addition, total submitted and assigned charges for services provided pre- and post-hospitalization were also aggregated. The time window selected was 30 days before admission and 90 days after discharge for CABGs and pacemakers, and 7 days prior to the lens procedure. The lens file includes a much shorter window because initial analysis showed that little activity occured more than one week before the lens procedure. The organization of the file is shown on Table 1-4. Chapters 3-5 detail the analysis of these three procedural files.

TABLE 1-3

SAMPLE SIZES FOR SURGICAL PROCEDURE FILES

	Alabama	Wisconsin
Lens Procedures	11,499	12,274
Coronary Artery Bypass Grafts	1,842	2,004
Permanent Pacemaker Insertions	1,293	771

Source: Medicare Part B claims, 1984.

Table 1-4

ORGANIZATION OF THE SURGICAL PROCEDURE FILES

CABG AND PACEMAKER INSERTION PROCEDURES

30 Days Pre-Procedure	During Inpatient Stay	90 Days Post-Procedure
Out-of-hospital procedures	Inpatient	Out-of-hospital procedures
Office visits	Visits	Office visits
ER visits	Consultant visits	ER visits
Consultant visits	Surgery	Consultant visits
ECG	Assistant surgery	ECG
Other related medical tests	Anesthesiology	Other related medical tests
Total hospital charges	Radiology	
	Laboratory	
	Other related medical tests	

LENS PROCEDURES

7 Days Pre-Procedure	Procedure	No Post Period
Ophthalmic ultrasound	Surgeon	
Visits by ophthalmologist	Assistant surgeon	
Consults by ophthalmologist	Anesthesiology	
Eye examinations		
Other related eye services		

1.4 Overview of the Report

Chapter 2 decomposes Medicare physician spending by specialty and procedure, with special attention to practice dependence on high volume, high dollar surgeries. Chapters 3, 4, and 5 analyze three procedures in detail: lens procedures, CABGs, and pacemaker insertions, respectively. Chapter 6 uses the Resource-Based Relative Value Scale developed by Hsaio and Stason to determine the "comparable worth" of surgical procedures.

2.0 WHERE DOES THE PART B DOLLAR GO?

2.1 Part B Expenditures By Type of Service, Location, and Specialty

Not surprisingly, physician visits and surgery account for the bulk of the Part B dollar. As shown on Table 2-1, 30-34 cents go toward "medical care" (defined here to include only visits*) and another 34-35 cents for surgical operations. (Under the Medicare terminology, "surgery" includes not only therapeutic interventions, but also diagnostic procedures such as endoscopies.) Radiology services account for the third largest share of the Part B dollar (11-12 cents), with all of the remaining service categories representing much smaller shares. The relatively small amount paid for laboratory services reflects two factors: (1) the exclusion of independent labs from this study; and, to a lesser extent, (2) the prohibition of direct billing by physicians for lab tests they do not personally provide, beginning July 1, 1984.

Service shares are remarkably consistent across our four states. Washington physicians appear to provide somewhat less (or less costly) medical care and somewhat more tests, but the differences are not marked.

Part B spending takes place disproportionately in the hospital (see Table 2-2); over one-half of the Medicare physician dollar (52-63%) is expended on inpatient services or about twice what is spent in the physician's office. The relatively smaller hospital share for Washington physicians (and subsequently larger office share) is consistent with the shorter lengths of stay in that state. Outpatient departments account for only 5-10 percent, with the remaining locations being very infrequent.

What physician groups account for most of the spending? Specialties receiving (roughly) 10 cents or more of the Part B dollar include general and family practitioners, internists, general surgeons, ophthalmologists, and radiologists (see Table 2-3). Specialties with small shares tend to be themselves small in number (e.g., allergists) or they treat a dispropor-

*Most carriers include specialized services, such as ECGS, allergy tests, etc., in the "medical care" category as well. We have removed all such procedures (defined as CPT-4 codes in the 90000 series, exclusive of visits and consultations) and created a new service category for them, entitled "special tests".

TABLE 2-1

DISTRIBUTION OF TOTAL MEDICARE PHYSICIAN EXPENDITURES BY TYPES OF SERVICE

TYPE OF SERVICE	ALABAMA	CONNECTICUT	WASHINGTON	WISCONSIN
Medical Care (visits)	33.8%	34.3%	29.9%	32.6%
Surgery	34.9	34.7	33.8	34.7
Consultations	2.5	4.2	2.6	2.9
Radiology	12.4	11.1	12.4	12.1[a]
Laboratory	4.1	2.6	5.8	5.1
Anesthesia	4.3	5.4	5.5	5.0
Assistant Surgery	1.1	1.8	2.6	2.0
Special Tests[b]	6.9	5.2	6.4	5.6
Other Services	0.0	0.7	1.0	0.0[a]
	100.0%	100.0%	100.0%	100.0%

[a] Wisconsin radiology expenditures include other services.

[b] Includes specialized services such as ECGs, allergy tests, pulmonary function studies, etc.

Source: Medicare Part B claims data, 1984.

TABLE 2-2

DISTRIBUTION OF TOTAL MEDICARE PHYSICIAN EXPENDITURES BY LOCATION

LOCATION	ALABAMA	CONNECTICUT	WASHINGTON	WISCONSIN
Office	26.7%	30.9%	36.7%	26.6%
Hospital	63.4	60.1	51.7	61.6
Outpatient Department	7.4	4.9	8.8	9.5
Skilled Nursing Facility	1.0	2.8	1.7	0.4
Home	0.2	0.6	a	1.8
Other Locations	1.3	0.7	1.1	0.1
	100.0%	100.0%	100.0%	100.0%

[a]Frequency less than 0.1 percent.

Source: Medicare Part B claims data, 1984.

TABLE 2-3

DISTRIBUTION OF TOTAL MEDICARE PHYSICIAN EXPENDITURES BY PRACTICE SPECIALTY

SPECIALTY	ALABAMA	CONNECTICUT	WASHINGTON	WISCONSIN
General/Family Practice	13.0%	5.4%	12.5%	10.3%
Internists	17.4	15.7	16.3	18.7
Allergists	a	0.2	0.1	0.1
Cardiologists	5.8	9.0	4.5	4.1
Dermatologists	1.4	1.7	1.1	1.1
Gastroenterologists	1.8	2.7	0.9	1.4
Nephrologists	2.0	2.3	0.5	0.2
Pulm. Dis. Specialists	1.3	1.7	0.7	0.5
General Surgeons	10.8	9.8	9.1	9.5
Neurosurgeons	1.3	1.1	1.1	1.1
OB/GYNs	0.9	0.9	0.7	0.8
Ophthalmologists	10.2	11.3	10.2	8.6
Orthopedic Surgeons	6.0	6.5	6.7	6.5
Otolaryngologists	1.3	1.4	1.3	1.3
Plastic Surgeons	0.4	0.4	0.6	0.3
Thoracic Surgeons	4.8	1.4	1.7	3.4
Urologists	4.4	4.0	3.9	4.3
Neurologists	1.0	1.3	1.0	1.3
Psychiatrists	1.0	0.9	2.2	1.1
Anesthesiologists	4.5	5.4	5.5	5.2
Pathologists	0.7	0.1	1.2	1.0
Radiologists	9.8	10.4	10.0	8.6
Multi-Specialty Groups	a	5.7	7.9	10.0
Other Specialties	0.2	0.7	0.3	0.6
	100.0%	100.0%	100.0%	100.0%

[a]Frequency less than 0.1 percent.

Source: Medicare Part B claims data, 1984.

tionately non-elderly casemix (e.g., OB-GYNs). Interstate differences are probably due largely to underlying differences in the composition of the physician stock. The Connecticut physician stock, for example, includes only one-third as many general and family practitioners as that of the other three states, but twice the number of cardiologists (AMA, 1984). Accordingly, Medicare spends far less on Connecticut GPs and FPs and somewhat less on internists but disproportionately more on medical subspecialists, especially cardiologists.

2.2 High Dollar, High Volume Procedures by Specialty

In Table 2-3 above, we saw that ophthalmologists accounted for 9-11 percent of Part B physician expenditures, yet this specialty represents only a little more than 3 percent of the physician stock in these states (AMA, 1984). What are ophthalmologists doing to generate this disproportionate share of the Part B dollar? As seen in Table 2-4, a single procedure accounts for 42-62 percent of ophthalmologists' Medicare revenues: cataract extraction accompanied by the insertion of an intraocular lens. Not only is this procedure performed frequently, but as shown in Table 2-5, average Medicare allowed charges are in the $1,300-$1,600 range. Other surgical procedures, including related cataract operations, account for an additional 16-18 percent of revenues. By contrast, eye exams and other kinds of visits are less than one-quarter of the Medicare dollar.

Although not as marked as ophthalmologists, urologists also receive a large share of their Medicare dollars from a single procedure; transurethral resections of the prostate (TURPs) represent 34-41 percent of their revenues (see Table 2-6). Interestingly, Medicare pays as much for this procedure as for the more complex suprapubic prostatectomy; reasonable charges for both operations are in the $900-$1,100 range (refer to the third page of Table 2-5). Although a diagnostic procedure averaging "only" $100-$200 (not shown), cystourethroscopies are performed so frequently that they account for 8-12 percent of urologists' revenues from Medicare.

TABLE 2-4

WHAT DO OPHTHALMOLOGISTS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	3.9%	11.7%	6.7%	6.1%
Eye Exams	7.2	10.9	11.1	10.0
Consultations	0.5	0.9	0.7	0.4
Other Visits	0.9	0.6	0.2	0.5
Cataract Extraction with IOL Implant	61.7	41.6	54.4	53.3
Cataract Extraction Only	1.0	3.2	1.2	2.6
IOL Implant Only	2.4	1.4	1.7	1.5
Dissection of Secondary Cataract	1.2	0.2	0.4	0.6
Laser Photocoagulation	0.9	2.2	1.3	1.9
Excision of Chalazion	1.6	0.1	0.1	0.1
Other Surgery	11.7	13.2	11.2	11.1
Ophthalmic Ultrasound	4.0	2.3	3.2	3.4
Other X-Rays	0.4	a	a	a
Assistance at Surgery	a	6.7	4.1	5.4
Tests	2.2	4.8	3.3	3.1
Total $ (Millions)	$23.9	$25.6	$26.6	$25.6

[a] Frequency less than 0.05 percent.

Source: Medicare Part B claims, 1984.

TABLE 2-5

AVERAGE MEDICARE ALLOWED CHARGES FOR HIGH VOLUME SURGICAL PROCEDURES

	Alabama	Connecticut	Washington	Wisconsin
General Surgeons				
Mastectomy (19240)	$ 974	$ 869	$ 805	$ 869
Pacemaker insertion, atrial (33206)	823	856	713	699
Pacemaker insertion, ventricular (33207)	940	960	814	612
Pacemaker insertion, AV (33208)	967	1,035	882	782
Thromboendarterectomy, carotid (35301)	995	1,455	1,557	1,307
Partial colectomy (44140)	1,072	1,303	1,096	1,080
Cholecystectomy (47600)	674	883	641	676
Cholecystectomy w/cholangiography(47605)	802	988	832	776
Cholecystectomy w/CDE (47610)	811	1,071	872	908
Exploratory laparotomy (49000)	636	620	532	541
Inguinal hernia repair (49505)	419	560	481	442
Cardiologists				
Left heart catheterization (93547)	586	526	531	521
Right & left heart catheterization (93549)	765	673	683	709
Pacemaker insertion (33206)	937	761	760	519
Pacemaker insertion (33207)	1,007	1,000	814	429
Pacemaker insertion (33208)	1,080	1,067	974	738
Neurosurgeons				
Thromboendarterectomy (35301)	1,027	1,784	1,561	1,451
Craniectomy for hematoma (61310)	1,615	1,853	1,436	1,647
Laminectomy, lumbar (63005)	1,505	1,712	1,399	1,274
Laminotomy for disc (63030)	1,033	1,275	1,299	1,313
Craniectomy for tumor (61510)	2,127	2,207	1,876	1,799

TABLE 2-5

AVERAGE MEDICARE ALLOWED CHARGES FOR HIGH VOLUME SURGICAL PROCEDURES (cont'd)

	Alabama	Connecticut	Washington	Wisconsin
OB-GYNs				
Total hysterectomy (58150)	854	1,011	861	873
Vaginal hysterectomy (58260)	900	908	844	940
Vaginal hysterectomy w/ repair (58265)	857	972	969	1,046
Ophthalmologists				
Fistulization of sclera (66170)	449	804	1,595	579
Lens extraction, intra-capsular (66920)	903	1,085	975	943
Lens extraction & IOL implant (66980)	1,372	1,607	1,463	1,344
IOL implant only (66985)	909	1,201	845	925
Orthopedic Surgeons				
Arthroplasty, prosthesis (27125)	1,396	2,271	1,155	1,405
Total hip replacement, simple (27130)	1,821	2,486	2,064	1,930
Total hip replacement, complex (27131)	1,794	2,395	2,344	1,986
Femoral fx w/internal fixation (27236)	1,041	1,129	1,133	1,144
Femoral fx w/internal fixation (27244)	1,009	1,169	1,160	1,068
Total knee replacement (27447)	1,787	2,192	2,215	1,860
Thoracic Surgeons				
Pacemaker insertion (33206)	817	853	784	721
Pacemaker insertion (33207)	957	1,014	1,075	679
Pacemaker insertion (33208)	950	1,103	1,146	876

TABLE 2-5

AVERAGE MEDICARE ALLOWED CHARGES FOR HIGH VOLUME SURGICAL PROCEDURES (cont'd)

	Alabama	Connecticut	Washington	Wisconsin
CABG, single artery (33510)	1,679	3,046	2,332	3,102
CABG, 2 arteries (33511)	2,175	3,825	3,573	3,563
CABG, 3 arteries (33512)	2,680	4,378	3,709	3,792
CABG, 4 arteries (33513)	3,028	4,470	4,440	3,839
CABG, 5 arteries (33514)	3,242	4,403	4,822	3,822
CABG, 6+ arteries (33516)	2,454	4,300	4,637	3,888
Thromboendarterectomy (35301)	966	1,485	1,516	1,133
Urologists				
TURP (52601)	925	1,077	1,109	1,010
Prostatectomy, suprapubic (55821)	991	1,137	1,063	1,014

Source: Medicare Part B claims, 1984.

Note: All charges have been averaged at the practice level.

TABLE 2-6

WHAT DO UROLOGISTS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	7.2%	8.4%	8.0%	4.9%
Hospital Visits	5.7	6.0	1.1	2.2
Consultations	4.0	4.5	2.6	3.3
Cystourethroscopy	9.3	11.5	7.6	11.7
TURP	34.1	33.4	36.6	40.9
Suprapubic Prostatectory	1.3	2.9	1.1	1.0
Prostate Biopsy	1.0	0.6	0.6	0.4
Other Surgery	29.0	27.9	34.3	29.1
Assistance at Surgery	1.8	1.0	2.2	0.8
X-Rays	2.2	1.0	1.4	0.9
Lab Tests	4.0	2.3	4.2	3.5
Total $ (millions)	$10.2	$ 9.0	$10.2	$12.9

Source: Medicare Part B claims, 1984.

In contrast to ophthalmologists and urologists the practice of general surgeons is not concentrated in a single procedure. As shown in Table 2-7, general surgeons provide a heterogeneous mix of surgical services; their top 5 surgical procedures (mastectomy, thromboendarterectomy, partial colectomy, cholecystectomy, and hernia repair) generate only one-fifth of average Medicare revenues. Although general surgeons insert 20-40 percent of all Medicare pacemakers*, these procedures still account for a negligible share of earnings.

Comparable tables for other specialties can be found in Appendix A. These include cardiologists, general and family practitioners, internists, orthopedic surgeons, and thoracic surgeons.

2.3 Unequal Distribution of Medicare Revenues

Earlier in Chapter 1.2, we saw that there were 3,900-5,600 physician practices treating Medicare patients in each of our states. Most of the Part B dollars, however, are paid to a relatively small number of providers. In Table 2-8, all physician practices have been placed in rank order based on their total Medicare revenues and then grouped in deciles. (Decile number 1 represents the ten percent of practices with the smallest revenue share and decile number 10, the ten percent with the largest share.) The unequal distribution of Medicare revenue across practices is dramatic. Ten percent of practices receive 47-58 percent of all Medicare Part B revenues depending on the state; one-half of practices (deciles 1 through 5) account for only 4-8 percent of Medicare dollars.

Of course, inequalities in distribution will be partly due to specialty mix; there are numerous pediatricians treating at least one Medicare patient but per practice Part B revenues are undoubtedly small. Nevertheless, the same concentration of Medicare revenues within a few practices can be demonstrated for individual specialties as well (see Table 2-9). This means that, even for Medicare-dependent specialties like cardiology, a handful of practices are providing the bulk of cardiac services to Medicare patients. Since we do not know the size of these practices, however, these few practices could include a dispropriate number of individual cardiologists.

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*The remainder are performed by cardiologists and thoracic surgeons (see Chapter 5).

TABLE 2-7

WHAT DO GENERAL SURGEONS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	7.0%	6.2%	4.1%	5.6%
Hospital Visits	9.0	7.3	2.0	7.3
Consultations	2.1	4.0	1.9	2.4
Other Visits	1.7	1.2	0.6	2.3
Modified Radical Mastectomy	2.0	2.2	1.7	2.3
Permanent Pacemaker Insertion	1.7	0.8	1.5	0.5
Thromboendarterectomy, carotid	2.5	1.1	7.2	2.6
Partial Colectomy	3.7	7.4	3.9	5.9
Cholecystectomy	7.3	6.5	5.6	7.3
Exploratory Laparotomy	1.1	0.7	0.6	1.1
Inguinal Hernia Repair	2.3	3.4	2.5	2.6
Upper GI Endoscopy	2.3	0.3	0.5	1.0
Other Surgery	47.9	53.0	57.6	51.8
Assistance at Surgery	4.2	4.5	7.3	3.8
Total $ (Millions)	$24.9	$21.5	$23.5	$28.4

Source: Medicare Part B claims, 1984.

TABLE 2-8

DISTRIBUTION OF TOTAL PART B REVENUES ACROSS ALL MEDICARE PRACTICES

% Practices	% Medicare Revenues - All Practices			
(deciles)	Alabama	Connecticut	Washington	Wisconsin
1	0.01%	0.02%	0.01%	0.02%
2	0.07	0.14	0.13	0.26
3	0.33	0.55	0.68	1.00
4	0.97	1.41	1.65	2.30
5	2.26	2.92	3.03	4.04
6	4.20	5.16	4.73	6.15
7	6.85	7.77	6.86	8.89
8	10.58	11.29	9.81	12.67
9	17.58	16.72	15.13	18.16
10	57.16	54.02	57.97	46.50

Source: Medicare Part B claims, 1984.

TABLE 2-9

PERCENT OF MEDICARE REVENUES EARNED BY TOP 10% OF PRACTICES BY SPECIALTY

	Alabama	Connecticut	Washington	Wisconsin
General Practice	43.3%	36.2%	38.4%	36.3%
Family Practice	40.8	32.8	38.0	34.1
Cardiology	46.7	45.0	46.5	42.5
Internal Medicine	47.5	29.5	45.9	29.3
General Surgery	43.0	33.9	49.3	29.8
Ophthalmology	42.8	36.1	43.0	40.8
Orthopedic Surgery	42.7	36.8	40.7	31.0
Urology	32.2	36.7	32.1	32.9
Anesthesiology	57.7	44.2	50.3	24.9
Radiology	55.1	51.1	51.1	47.6

PERCENT OF MEDICARE REVENUES EARNED BY BOTTOM 50% OF PRACTICES BY SPECIALTY

	Alabama	Connecticut	Washington	Wisconsin
General Practice	7.0%	10.2%	11.9%	11.8%
Family Practice	6.4	15.3	11.7	14.5
Cardiology	3.2	15.9	7.8	7.2
Internal Medicine	6.9	17.1	11.2	16.7
General Surgery	8.9	13.1	9.5	16.9
Ophthalmology	9.0	14.3	8.5	10.2
Orthopedic Surgery	10.7	17.5	13.2	18.2
Urology	16.8	18.7	15.6	19.4
Anesthesiology	5.7	5.9	15.2	25.1
Radiology	3.1	5.7	2.4	5.7

Source: Medicare Part B claims, 1984.

2.4 Practice Dependence on High Dollar, High Volume Procedures

Earlier we saw that one or two procedures constituted a large portion of Medicare revenues for certain specialties. Those tables were based on specialty-wide, aggregate statistics, and did not take into account the fact that only some physician practices actually perform the procedures. The smaller the proportion of practices performing an expensive procedure, and/or the higher the volume, the more dependent those practices will be on Medicare patients.

Table 2-10 shows that the majority of ophthalmology practices in all four states perform lens procedures. It is noteworthy, however, that such a substantial minority (17-28%) do not perform such lucrative operations. Despite the large number of ophthalmology practices doing lens procedures, the absolute volume is so great and fees are so high, that earnings remain high. Average total Medicare revenues are substantial, ranging from $83,532 to $152,694 per practice depending on the state. Reimbursement for lens procedures represents over one-half of all Medicare revenues received by those practices doing lens procedures. Not only are lens procedures a chief source of financial support for ophthalmology practices, but the absolute dollars suggest that they are very dependent upon the Medicare program generally.

The extent of Medicare dependence is also dramatic for these thoracic surgery practices performing coronary artery bypass graft (CABG) surgery. The revenues generated from these procedures are considerable, almost $300,000 per practice in Alabama and Washington, as shown in Table 2-11. (Smaller revenues in Wisconsin can be attributed to the much larger proportion of thoracic surgery practices that perform CABGs, compared with the other three states, while those in Connecticut may be due to a more varied casemix or greater competition among practices for available cases.) Since CABG surgery represents only one-half or less of all Medicare revenues for thoracic surgeons, the total dollars flowing from the Part B program to these practices are clearly substantial. Of course, thoracic surgery practices are apt to earn large gross incomes from all insurors. Nevertheless, an average of one quarter to one-half million dollars probably represents a major share of total practice earnings.

By contrast, many different specialties can insert pacemakers, including cardiologists, general surgeons, and thoracic surgeons. This, combined with the relatively low volume of pacemaker surgery, means that this procedure

Table 2-10

MEDICARE DEPENDENCE OF OPHTHALMOLOGY PRACTICES PERFORMING LENS PROCEDURES[a]

	Alabama	Connecticut	Washington	Wisconsin
Percent of Practices Performing Procedure	78.5%	83.3%	72.2%	78.9%
Average Medicare Revenues from Procedure[b]	$152,694	$83,532	$114,112	$87,792
Percent of Medicare Revenues from Procedure[b]	59.2%	50.2%	58.0%	59.2%

[a] Includes cataract extraction (all methods), one-stage procedures (extraction plus IOL implant), IOL insertion performed at a later date, and assistant surgeons' charges for those procedures.

[b] Based on those practies performing the procedure only.

Source: Medicare Part B claims, 1984.

Table 2-11

MEDICARE DEPENDENCE OF THORACIC SURGERY PRACTICES PERFORMING CABGs[a]

	Alabama	Connecticut	Washington	Wisconsin
Percent of Practices Performing Procedure	37.5%	35.3%	28.0%	72.5%
Average Medicare Revenues from Procedure[b]	$289,155	$121,238	$291,007	$159,130
Percent of Medicare Revenues from Procedure[b]	47.5%	38.8%	43.5%	53.8%

[a] Includes assistants at surgery.

[b] Based on those practices performing the procedure only.

Source: Medicare Part B claims, 1984.

accounts for a relatively small share of Medicare practice revenues: 2-8 percent (see Table 2-12). Thus, changes in reimbursement for pacemakers can be expected to have a very different impact on physicians than will changes in payments for CABGs or lens procedures.

Similar tables for three other high volume, high dollar Medicare procedures can be found in Appendix B. These are: cardiac catheterizations, total hip replacements, and prostatectomies.

Table 2-12

MEDICARE DEPENDENCE OF PHYSICIANS INSERTING PACEMAKERS

	Alabama	Connecticut	Washington	Wisconsin
Percent of Practices Performing Procedure:				
Cardiologists	19.3%	27.8%	30.6%	38.0%
General Surgeons	11.6	8.1	16.7	15.0
Thoracic Surgeons	47.9	88.2	28.0	54.9
Average Medicare Revenues From Procedure:				
Cardiologists	$14,867	$16,874	$11,119	$3,539
General Surgeons	9,847	6,853	6,621	2,157
Thoracic Surgeons	19,166	13,588	13,319	4,000
Percent of Medicare Revenues From Procedure:				
Cardiologist	6.1%	5.4%	6.5%	3.0%
General Surgeons	5.6	5.5	3.3	1.9
Thoracic Surgeons	7.1	8.2	8.0	3.6

Source: Medicare Part B claims, 1984.

3.0 LENS PROCEDURES

3.1 Clinical Overview

Lens procedures are the most frequent surgical operations performed on Medicare beneficiaries. The high prevalence of cataracts in the elderly, the fact that each of us has two eyes, and progress in related technologies that have resulted in remarkable liberalization of indications for these procedures all contribute to this result. The fact that, until recently, the cataract was removed at one operation and an intraocular lens (IOL) inserted in a subsequent operation, further increased the frequency of operations. Now the trend is to perform both procedures during a single operation.

3.1.1 Related Technologies

No areas of medical technology have evolved more rapidly than those related to the diagnosis and treatment of eye diseases. Improved diagnostic techniques for examining the retina, operating microscopes, lasers, and the development of the intraocular lens have revolutionized the treatment of cataracts and diseases of the retina.

Even five years ago cataract extractions were generally performed by an "intracapsular" technique in which the entire lens, including its capsules, was frozen and removed intact. Development of phacoemulsification has permitted an alternative which is simpler, safer, quicker and better adapted to the simultaneous placement of an IOL. This technology involves sonic disruption of the lens material which is then aspirated. The posterior capsule is left in place to provide support for the IOL; hence this procedure is termed "extracapsular".

The other major technological innovation related to cataracts has been the development of the IOL itself. Before IOLs, patients were fitted with unwieldy glasses or, more recently, contact lenses. With IOLs these have become unnecessary. At first, IOLs were inserted in the interior chamber of the eye in front of the iris (colored part of the eye). These led to frequent complications. Next came iris-supported IOLs, but enthusiasm for these waxed

and then also waned in the face of increasing numbers of poor long-term results. The current "state of the art" is a posterior chamber IOL inserted at the same time as the cataract is removed by phacoemulsification.

3.1.2 Surgical Procedure

Lens extractions are performed under local anesthesia. A surgical incision is made at the margin of the cornea to gain access to the exterior chamber of the eye. The lens is then removed either intact (intracapsular extraction) or by aspiration after phacoemulsification (extracapsular extraction).

Nearly all cataract extractions are currently done by the latter method and a posterior chamber IOL inserted at the same operation. If the intracapsular method is used, and the decision is made to place a posterior chamber IOL, this generally has to be done at a second operation sufficiently long after the cataract extraction so that fibrous (scar) tissue support for the lens has had time to develop.

The entire phacoemulsification procedure, including insertion of the IOL lens, takes an average of 45 minutes, and as little as 20 minutes in the hands of an expert. Insertion of the IOL itself takes less than 5 minutes. Only a single surgeon is required plus an operating room nurse. In the vast majority of patients, the operation can be performed on an outpatient basis.

3.1.3 Clinical Indications and Success

Clinical indications have liberalized remarkably in recent years. Even 10 years ago, 20/200 vision in the affected eye was a criterion. Now the procedure is recommended if the degree of vision required for any of life's major activities is compromised. The limit for a driver's license (20/40), for example, may be that criterion.

Immediate adverse results are infrequent following phacoemulsification/IOL. Some patients will develop opacification of the retained posterior capsule at a later time, however, which is sufficient to impair vision. Previously, these patients required a second operation during

which this capsule was slit with a scalpel (posterior capsulotomy). The development of the YAG (yttrium aluminum garnet) laser obviates the need for this operation. This laser can be used to create holes in the posterior capsule in five minutes and can be done as an office procedure.

3.2 What Kind of Lens Operations Are Performed and Where?

The lens procedures analyzed in this chapter include four CPT-4 procedure codes:

- 66920 - Lens extraction, intracapsular
- 66940 - Lens extraction, extracapsular
- 66980 - Insertion of intraocular lens (IOL) at the time of cataract extraction (one-stage procedure)
- 66985 - Intraocular lens insertion subsequent to earlier cataract extraction

As seen in Table 3-1, almost all of the lens procedures in both states (90%) involve the one-stage operation. The number (N) of lens procedures shown in Table 3-1 indicates the number of operations performed and not the number of Medicare beneficiaries treated. In fact, 13.5 percent of Alabama beneficiaries and 6.5 percent of those in Wisconsin had more than one operation during the course of the year. Typically, this involved an extraction with IOL implant in one eye, followed three to five months later by another one-stage procedure in the other eye.

The greater number of procedures per patient in Alabama is reflective of overall higher utilization rates in that state. Surgical rates for cataracts were 25.6 operations per 1,000 beneficiaries in Alabama versus only 20.5 in Wisconsin. Why so many in Alabama? One explanation may be a "catch-up" phenomenon, i.e., that the necessary technology and ophthalmologists have only recently been available in this state. Alabama has fewer physicians per capita than all but six states, but its relative supply has been increasing far faster than the national average (AMA, 1984).

Unlike many surgical operations, lens procedures can be performed in non-hospital settings. Although the majority of procedures were performed on an inpatient basis, almost one-third of Alabama operations and one-fifth of those in Wisconsin took place outside the hospital (Table 3-2). The most common ambulatory setting was an outpatient department (OPD). There were no

TABLE 3-1

PROCEDURE MIX OF LENS OPERATIONS

	Alabama (N=11,499)	Wisconsin (N=12,274)
Lens extraction, intracapsular	2.4%	6.3%
Lens extraction, extracapsular	1.1	0.9
Extraction and IOL insertion	90.9	89.3
IOL insertion only	5.6	3.5
	100.0%	100.0%

Source: Medicare Part B claims, 1984.

TABLE 3-2

LOCATION OF LENS OPERATIONS

	Alabama	Wisconsin
Hospital	69.1%	78.3%
Outpatient Department	28.6	20.2
Office	2.1	1.4
Other	0.2	0.1
	100.0%	100.0%

Source: Medicare Part B claims, 1984.

differences in procedure mix across locations; one-stage procedures were as likely to be performed in an OPD as were extractions alone or IOL implants alone.

3.3 What Do Lens Procedures Cost?

For purposes of this study, the cost of lens procedures is defined as the Medicare reasonable charge for the physicians' services. This represents what the Part B program must pay, including patient co-pays. Medicare reasonable charges are displayed in Table 3-3 for the four types of lens procedures. In parentheses under each average charge is its coefficient of variation (CV). The coefficient of variation is defined as the standard deviation divided by the mean; it provides a standardized measure for comparing variation across groups with different means. Lower CVs indicate less cost variability in one state than in another. The one-stage procedure is quite expensive, roughly $1,400 in both states, although this is still considerably less than the cost of equivalent surgery if done in two operations (the sum of the charges for lens extraction alone and for IOL insertion only is about $1,800).

Nevertheless, the one-stage procedure is reimbursed 40-50 percent more than lens extraction alone. Clinical evidence cited earlier indicates that the added time to insert an IOL is only about five minutes. We will return to this issue of potential overpayment in Chapter 6.

To the extent that ophthalmologists do not accept assignment, total costs to beneficiaries will be even higher. Assignment rates for lens procedures averaged 55 percent in Alabama and only 32 percent in Wisconsin. Usual charges for nonassigned one-stage lens procedures averaged $300 above the Medicare reasonable in Alabama and $260 in Wisconsin. This differential approximately doubles the out-of-pocket liability for those beneficiaries.

The coefficients of variations, or CVs, for each group of charges are displayed in parentheses below their respective means in Table 3-3. These CVs are quite low, particularly those for the one-stage procedures. A C.V. of 0.09 for the one-stage procedure charge in Alabama, for example, means that two-thirds of those operations cost between $1,286 and $1,540 (± $127 from the average of $1,413).

TABLE 3-3

AVERAGE MEDICARE REASONABLE CHARGES FOR LENS PROCEDURES (CVs in parentheses)

	Alabama	Wisconsin
Lens extraction, intracapsular	$ 901 (0.14)	$ 950 (0.14)
Lens extraction, extracapsular	867 (0.23)	1,115 (0.16)
Extraction and IOL insertion	1,413 (0.09)	1,357 (0.07)
IOL insertion only	981 (0.19)	940 (0.14)

Source: Medicare Part B claims, 1984.

What variation that does exist can be attributed primarily to physicians' reasonable charge localities and to differences in their customary charges.* Table 3-4 presents allowed charges for the one-stage procedure for each of Wisconsin's ten reasonable charge localities. Average charges range from a low of $1,245 in Green Bay to $1,531 in the rural Northern counties. Based on regression analysis (not shown), geographic location (as measured by these localities) explains 37 percent of the variation in allowed charges.

3.4 What Services Are Associated with Lens Procedures?

Table 3-5 shows services related to one-stage procedures that could form the basis for a reimbursement package. These services also indicate the potential for future unpackaging that might result if reimbursement for the surgery itself were reduced. The first column under each state heading indicates the relative frequency of these services, and the second column indicates the average reasonable charge for those services. For example, 30 percent of Alabama patients received ophthalmic ultrasound tests the week prior to surgery, with an average charge of $112. The bottom row, "average package costs," represents the average weighted cost for all services, using the relative frequency as weights.

As has been found in previous research, there are marked state differences in the use of related physician services. Alabama ophthalmologist practices virtually never use an assistant during lens procedures, while their Wisconsin colleagues do so 41 percent of the time. During the week before the operation, on the other hand, Alabama ophthalmologists are twice as likely as those in Wisconsin to bill their patient for a visit, eye exam, or consultation (28% vs. 10%).** They are also somewhat more likely to order (or provide) ophthalmic ultrasound.

The net impact of these related services in Alabama, however, is to raise the cost of one-stage lens procedures by only 3 percent, from $1,413 to $1,456. By contrast, Wisconsin costs increase 10 percent, largely due to the frequent use of assistant surgeons in that State.

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*Specialty accounts for little of the variation in charges for these procedures. Ophthalmologists perform over 99 percent of lens procedures in both states.

**We emphasize the word "billing" because many ophthalmologists may in fact see their patients prior to surgery but include such visits in their global surgical fee.

TABLE 3-4

MEDICARE REASONABLE CHARGES BY WISCONSIN LOCALITY FOR LENS EXTRACTION WITH IOL INSERTION (One-Stage Procedure)

Locality	Mean	C.V.	N
Milwaukee	$1,406	0.06	2,846
Madison	1,372	0.05	1,376
Eau Claire	1,425	0.05	890
Wausau	1,375	0.05	600
Green Bay	1,245	0.05	932
Racine-Kenosha	1,287	0.08	1,089
Appleton-Oshkosh	1,317	0.07	1,111
North	1,531	0.09	308
Central	1,419	0.03	85
South East	1,317	0.05	790
State-Wide	$1,413	0.09	10,027

Source: Medicare Part B claims, 1984.

TABLE 3-5

PACKAGE SERVICES FOR ONE-STAGE LENS PROCEDURES

	ALABAMA		WISCONSIN	
	Proportion of Cases Billed	Average Charge When Billed	Proportion of Cases Billed	Average Charge When Billed
Ophthalmologist's Charge for Surgery	1.00	$1,413	1.00	$1,357
Assistant at Surgery	a	a	0.41	278
Ophthalmologist's Visit Charges[b] (during preceding 7 days)	0.28	35	0.10	37
Ophthalmic Ultrasound (during preceding 7 days)	0.30	112	0.24	95
Average Package Cost		$1,456		$1,497

[a]Frequency less than one percent.

[b]Includes office visits, hospital visits, consultations, and eye exams.

Source: Medicare Part B claims, 1984.

4.0 CORONARY ARTERY BYPASS GRAFTS (CABGs)

4.1 Clinical Overview

4.1.1 Clinical Indications for Coronary Artery Bypass Graft Surgery

Coronary artery bypass graft (CABG) surgery, percutaneous transluminal coronary angioplasty (PTCA), and medications are the three fundamental approaches to the treatment of patients with angina pectoris and coronary artery disease. Controversy continues over the optimal treatment for many types of patients. CABG surgery is generally preferred in patients with disease of the left main coronary artery or disease of all three coronary arteries, and may be preferred in the face of less extensive disease if medications do not adequately relieve the angina. The role of PTCA is still evolving; it is a simpler procedure that does not involve major surgery and is growing rapidly in popularity, especially for patients with localized disease of only one or two coronary arteries. Improvements in medications and in the technique of PTCA may alter indications for CABGs significantly in future years.

4.1.2 Surgical Procedure

CABG surgery is, without question, one of the major achievements of modern medical technology. Introduced in 1968, the technique has been refined over the years so that, at present, it can be performed, at modest cost and with good surgical results, by any well-trained and well-supported cardiovascular surgical team. These operations are being performed in large community hospitals, as well as in teaching hospitals and heart institutes, throughout the U.S.

The procedure involves opening the chest to expose the heart and the use of cardiopulmonary bypass so that the heart may be stopped while the grafts are being inserted. Grafts to bypass obstructions in the coronary arteries may involve the internal mammary arteries (from the chest wall), saphenous veins ("harvested" in a simultaneous second surgical procedure from the patient's legs), or synthetic materials. From one to six or more grafts may be

inserted in a given patient. The entire operation, "skin to skin", takes three to four hours on average, though the critical part of the operation during which the grafts are sewed in place may take only an hour. In some hospitals, in fact, the primary surgeon may participate only in the graft placement and leave to assistants the opening, establishing cardiopulmonary bypass, harvesting of veins, and closing. A surgical team generally consists of the primary surgeon, one or more assistants, the anesthesiologist, a scrub nurse, and the bypass pump technician.

4.1.3 Success of CABGs

In low risk patients, operative mortality should be minimal. Heart failure, comorbid conditions, and age will increase risks, however. Clinical success is high in competent hands. Angina is relieved or improved in most patients, and, where it has been verified by coronary angiography, nearly all grafts remain open after one year. Life expectancy is statistically longer following CABG surgery than with medical treatment in patients with left main disease and three vessel disease, especially if left ventricular function is compromised. In other patient subgroups, any incremental benefit of surgery over PTCA or medications relates purely to improved quality of life from better relief of angina.

Bypass grafts deteriorate over time, as do the patient's own coronary arteries, so that initial benefits gradually wane. As a result, an ever-increasing proportion of patients are returning for a second CABG.

4.2 Overview of CABG Procedures in Sample States

Table 4-1 presents basic information on CABG procedures performed in Alabama and Wisconsin in 1984. In Alabama 1,842 CABGs were performed, a figure close to the 2,004 procedures performed in Wisconsin. However, as a percentage of Medicare enrollees, almost 25 percent more CABGs were performed in Alabama than in Wisconsin. There were 4.1 CABGs per 1,000 enrollees in Alabama, versus 3.3 in Wisconsin.

Table 4-1 also presents the distribution of CABGs by number of arteries bypassed. The most notable difference between the two states is that only five percent of CABGs are for one artery in Alabama, whereas 17 percent are of this type in Wisconsin.

TABLE 4-1

DISTRIBUTION OF CABGs BY PRACTICE AND SPECIALTY

	Alabama	Wisconsin
Total CABGs	1,842	2,004
Distribution by Type of CABG		
1 Artery	5%	17%
2 Arteries	13	10
3 Arteries	25	23
4 Arteries	27	24
5 Arteries	25	13
6 or more	5	13
Total number of physician practices performing CABGs	22	60
Percent of all CABGs performed by:		
Top 4 practices	71%	35%
Top 6 practices	82	47
Top 10 practices	94	60
Percent of CABGs performed by specialty:		
Thoracic surgeon	98%	74%
Multi-specialty group	0	11
Cardiologist	2	10
General surgeon	<1	5

Source: Medicare Part B claims, 1984.

At the upper end, it also appears that a greater percentage of procedures are performed on six or more arteries in Wisconsin. However, it is possible that this difference may be an artifact of previous billing systems. Both Alabama and Wisconsin converted to HCPCS in 1983. If a distinction was not made under the previous system in Alabama between five and six or more bypasses, then the observed frequencies might reflect physicians who had not yet fully adapted to the new billing codes.

Twenty-two physician practices performed CABGs in Alabama, while almost three times this number (60) performed CABGs in Wisconsin. The smaller number of practices performing bypasses in Alabama is further indicated by examining the percentages of all CABGs performed by the top few practices, as presented in Table 4-1. For example, the four largest practices in Alabama performed 71 percent of the bypass operations, whereas in Wisconsin the figure is only 35 percent. Part of this difference is no doubt attributable to the fact that all thoracic surgeons at the University of Alabama constitute a single practice, and may perform CABGs at several locations in addition to Birmingham. In Wisconsin there are a relatively large number of practices performing CABGs -- even the top ten practices perform only 60 percent of the total amount.

Another aspect of the large numbers of physician practices performing CABGs in Wisconsin is that there are a number of physicians who perform this operation comparatively rarely on the Medicare population. In Alabama 10 of the physician practices performed less than 35 CABGs during 1984, whereas in Wisconsin the equivalent figure is 40 practices. These practices account for only 2.5 percent of all CABGs performed in Alabama, but in Wisconsin they account for 22 percent of all CABGs performed in 1984.

It should be noted that these data apply only to Medicare enrollees, and that CABGs are performed on the nonelderly population as well. Indeed, in 1983, only about 35 percent of all CABGs were performed on patients aged 65 and over (NCHS, 1985). Therefore, if one roughly assumes that these data for Medicare beneficiaries represent only 35 percent of all CABGs performed by each physician, then a rate of 35 CABGs for Medicare enrollees translates into a rate of approximately 100 CABGs for patients of all ages. However, even this rate is only half of the accepted national standard of 200 procedures per year. Two hundred CABGs would roughly translate into 70 CABGs per year on

Medicare beneficiaries. Only seven of the practices in Alabama and only nine of the 60 practices in Wisconsin exceed this rate. It should be borne in mind that these figures are for practices, not individual physicians. It may be the case that in some of these practices there is more than one physician performing CABGs, which would indicate an even lower rate of performance of this procedure per physician. On the other hand, some physicians may belong to more than one practice thus underestimating the individual physician's caseload. In addition, some of these practices may perform a disproportionate share of their CABGs on the non-elderly, which would lessen questions about whether they are performing CABGs frequently enough to ensure the appropriate level of experience and skill for the operating team.

Table 4-1 also presents data on the specialty of the practices performing CABGs. In Alabama, this procedure is performed (almost) exclusively by physicians describing themselves as thoracic surgeons. Thoracic surgeons perform the vast majority of bypasses in Wisconsin, particularly since the 11 percent performed by a multi-specialty group may in fact be performed by a thoracic surgeon. However, 10 percent of CABGs are performed by practices with a listed specialty of cardiology and another 5 percent by general surgeons. These practices are apparently incorrectly classified, although it is not clear what impact this has on their specialty screens.

4.2.1 Physician Bills for CABGs

In analyzing the bills for CABGs, it was found that a number of factors had to be taken into consideration in order to determine the costs of these procedures. Data for these factors are presented in Table 4-2. To begin with, modifiers can be attached to the procedure code to reflect a bill different from the physician's usual fee. These modifiers were almost non-existent in Alabama, but were present in 8 percent of the CABGs in Wisconsin. The most common modifiers used were those indicating multiple procedures or a physician team.

A variety of surgical procedures were performed on a patient at the same time as the CABG. Some of these were comparatively minor, but others were major, including:

TABLE 4-2

PHYSICIAN BILLS FOR CABGs

	Alabama	Wisconsin
Total CABGs	1,842	2,004
Percent with modifiers	1.4%	8.0%
Percent with other major procedures:		
Aortic valve replacement	2.8%	1.8%
Mitral valve replacement	1.2	1.5
Other open heart procedures	2.4	3.5
Thromboendarterectomy	2.1	2.1
Total	8.5%	8.9%
Average number of bills submitted (CABGs without other major procedures and excluding anesthesiologist's bills) :	1.35	1.19

Source: Medicare Part B claims, 1984.

- aortic valve replacement with bypass (Code #33405)
- mitral valve replacement with bypass (Code #33430)
- thromboendarterectomy with neck incision (Code #35301)

Table 4-2 indicates that these three major procedures plus various other open heart surgeries were performed at the same time during 8.5 and 8.9 percent of all CABGs, respectively, in Alabama and Wisconsin. When these other procedures were performed, it was expected that the cost of the bypass should be reduced, particularly for the valve replacements where opening the chest is also required. For the thromboendarterectomies, which require a neck incision, the cost savings might not be expected to be as large.

As indicated earlier, a CABG is a complex procedure and requires the participation of more than one physician. Assistant surgeons are frequently members of the hospital's house staff and would, therefore, not submit a Part B Medicare bill. As a result, a bill was submitted for an assistant surgeon in only 36 percent of the CABGs in Alabama, but this was nevertheless twice that for Wisconsin. (In a very small percentage of instances there were additional bills submitted for the CABG by other surgeons.) The average number of bills submitted per CABG, excluding the anesthesiologist's bill, is 1.35 in Alabama and 1.19 in Wisconsin. In addition to the primary surgeon performing the bypass, these bills represent assistant surgeons, as well as other participating surgeons (such as members of a "team") who did not indicate themselves as assistants. The average number of bills per CABG was basically constant across the number of arteries bypassed. These multiple bills therefore apparently reflect different practice styles or the unavailability of appropriate housestaff at the hospital.

The primary conclusion to be derived from these data is that it is difficult to obtain a clear estimate for the total surgical costs of a CABG operation by itself. Not all CABG bills used modifiers when performed in conjunction with another major surgery. In some instances it appeared that the fee for the CABG was reduced, while in other instances it appeared that the fee for the other major surgery was reduced. In some cases a bill would be submitted for both a surgeon and an assistant surgeon, while in other cases there would be no bill for an assistant surgeon, but instead CABG bills for two surgeons with a "team" modifier. In yet other instances, only a single surgeon's bill would be submitted.

In the analyses of charges that follow, two approaches are utilized to obtain a more accurate picture of the costs of CABGs. First, some presentations will focus on only those bypasses that did not involve another major procedure. Second, some of the charge data will be presented summing up all the CABG surgical charges for that patient on the same day, excluding anesthesiology charges.

4.3 Reasonable Charge Levels for CABGs

One area of interest in analyzing the levels of charges for CABG procedures is how these levels vary with the number of bypasses performed. This question is illuminated in Table 4-3, which presents reasonable charge data for CABGs performed without another major surgical procedure.

The top part of the table presents data for the largest single CABG bill, that is, the one that represents the primary surgeon performing the procedure. In Alabama, the average charge is $1,931 for a single artery bypass, and increases to $2,681 for six or more arteries bypassed, an increase of $750. In Wisconsin, the magnitude of the increase is about the same ($705), but at all levels the average charge is much higher than in Alabama. For example, with a four artery bypass (the most frequent procedure performed), the average is $2,960 in Alabama but $3,914 in Wisconsin. The increase in average charges as the number of bypasses increases does not follow a consistent pattern. There is a large increase in both states as one moves from a single artery bypass to a double bypass. However, there is no regular pattern beyond that. The average charge actually decreases in Alabama between five and six bypasses. This may largely represent a difference between the fee level of the typical physician practice performing the five bypass procedure and the level for the practice performing the relatively uncommon six bypass CABG in Alabama.

Also presented in Table 4-3 are the coefficients of variation (CVs) of the average charge for each procedure. CVs offer a standardized measure for comparing variation across groups with different mean charges. CVs here range between .06 and .26, indicating a moderately tight distribution. For example, in Alabama for a triple bypass, the 90th percentile is $3,030 and the 10th

TABLE 4-3

AVERAGE REASONABLE CHARGES FOR CABGs WITHOUT OTHER MAJOR OPERATION[a]

	Alabama		Wisconsin	
	Charge	Difference	Charge	Difference
Largest Surgery Fee				
CABG, one artery	$1,931 (.11)	$508	$3,455 (.18)	$380
two arteries	2,439 (.10)	242	3,835 (.11)	76
three arteries	2,681 (.11)	279	3,911 (.09)	3
four arteries	2,960 (.17)	210	3,914 (.08)	34
five arteries	3,170 (.15)	-489	3,948 (.06)	212
six or more arteries	2,681 (.26)		4,160 (.08)	
All CABG Fees (except Anesthesiologist)				
CABG, one artery	$2,129 (.15)	$547	$3,662 (.18)	$293
two arteries	2,676 (.12)	252	3,955 (.13)	66
three arteries	2,928 (.16)	237	4,021 (.11)	53
four arteries	3,165 (.23)	131	4,074 (.19)	-11
five arteries	3,296 (.20)	-351	4,063 (.13)	325
six or more arteries	2,945 (.29)		4,388 (.14)	

[a]Coefficient of variation in parentheses.

Source: Medicare Part B claims, 1984.

percentile is $2,164. For a triple bypass in Wisconsin, the 90th and 10th percentiles are at $4,225 and $3,408, respectively. If one were to control for specialty and locality, which in part determine the Medicare reasonable charge, the distributions would most likely be substantially tighter.

The bottom half of Table 4-3 presents data for all surgical bills submitted for each CABG, as opposed to only the largest bill. These calculations depict all surgical charges for the CABG, whether performed individually, with an assistant, or as part of a team. These averages are approximately $200 higher than the charge for the primary surgeon only in Alabama, and approximately $125 higher in Wisconsin. For example, in Alabama the triple bypass average increases from $2,681 to $2,928. The CVs increase when these additional surgical charges are taken into account, which is expected given that only a portion of CABGs include a bill for an assistant. The difference in impact between the two states is largely the result of the greater prevalence of bills for surgical assists in Alabama. While the magnitude of these differences are not dramatic currently, they indicate the potential for extra billing in the future. (One potential response to reduced payment levels for CABG surgery could be increased bills for assistants.)

Given that thoracic surgeons perform the vast majority of CABGs, it is worthwhile to examine the pattern of charges for this specialty in greater detail. Table 4-4 presents average charges in Wisconsin by number of arteries bypassed and by reasonable charge locality. In order to obtain an accurate indication of fee levels, these averages were calculated for thoracic surgeons where no other major procedure was performed and where the CABG bill did not include any modifiers. For the Milwaukee area the average charge increases for each additional bypass. The increases are all less than $90, except for the shift from five to the "six or more" category. These results indicate that when specialty and locality are controlled for (in addition to the presence of modifiers or other major procedures), charges appear to follow a consistent pattern of small to moderate increases as the number of bypassed arteries increases. However, more detailed clinical evaluation would be required to determine whether the increases in fees are appropriate for the increasing time and difficulty of performing additional bypasses. The fact that most of the cells in the locality/bypass matrix contain fewer than 20 charges indicates that it is difficult to obtain sufficient volumes of data to

TABLE 4-4

AVERAGE REASONABLE CABG CHARGES FOR THORACIC SURGERY PRACTICES, WISCONSIN
(CABGs without other major procedures and without modifiers only)[a]

Locality[b]	Single Artery (#33510)	Two Arteries (#33511)	Three Arteries (#33512)	Four Arteries (#33513)	Five Arteries (#33514)	Six Arteries (#33516)
Milwaukee #4	$3,932 (31)	$3,952 (92)	$4,036 (170)	$4,065 (184)	$4,078 (137)	$4,213 (207)
Eau Claire #19			4,047 (47)			
Oshkosh #60			3,983 (20)	3,951 (33)		
Madison #15			3,447 (28)	3,466 (39)		
Green Bay #40	2,876 (69)		3,641 (25)	3,690 (54)		
State-Wide	3,178 (120)	3,853 (137)	3,915 (304)	3,914 (324)	3,955 (197)	4,173 (224)

[a]Ns in parentheses

[b]Excludes localities and procedure cells within locality that had less than 20 surgeries.

Source: Medicare Part B claims, 1984.

analyze the differential costs of additional bypasses in a rigorous manner while controlling for all factors. Nevertheless, the figures for the entire state combined (as shown in the bottom line of Table 4-4), or the figures for all specialties combined (as shown in Table 4-3) are useful. These data reflect the distribution of CABGs among specialties and localities as they are currently performed. To the degree that this distribution embodies the skill and experience levels of specific surgical teams, then it might not be an easy proposition (at least in the short run) to shift the performance of CABGs to other physicians in other areas in pursuit of policy objectives such as lower costs or higher quality.

4.4 The Impact of Major Procedures on the Charges for CABGS

As was described in Section 4.2, approximately five percent of CABGs involved other major operations on the same day. Most of these other procedures were represented by three specific operations: aortic valve replacement, mitral valve replacement, and thromboendarterectomy. It is expected that there are savings in time and effort involved in performing multiple operations at the same time on a patient, and that these savings should be reflected in the surgical charges. The carriers for Alabama and Wisconsin both specify that with multiple (non-incidental) procedures, the reasonable charge is to be based on 100 percent of the customary or prevailing charge for the most expensive procedure plus 50 percent of the customary or prevailing charge for the remaining procedure.

Table 4-5 presents calculations for CABGs performed at the same time as these other procedures. In order to ensure accurate calculations, one cannot look at the charges for CABGs alone, because it is not always the charge on the CABG that is reduced. Columns (1) and (2) present the charges for CABGs and the other procedures when each of these procedures is performed separately. The CABG cost is a weighted average of the costs of the number of arteries bypassed, where the weights reflect the proportions that occur in conjunction with the other major procedures. These two amounts are summed in column (3). The actual combined charges that result when the CABG is performed at the same time as the other procedure are presented in column (4). All of these charges, with the exception of those in column (2), represent

TABLE 4-5

THE IMPACT OF OTHER MAJOR PROCEDURES ON CABG CHARGES

	N	CABG Separately (1)	Other Procedure Separately (2)	Sum of (1)&(2) (3)	Actual Combined Charges (4)	Difference (4)-(3) (5)	Discount (5)/(3) (6)
ALABAMA							
Procedure:							
Aortic valve replacement	51	$2,765	$2,070	$4,835	$3,899	$-936	-19.4%
Mitral valve replacement	23	2,858	1,894	4,752	3,741	-1,011	-21.3
Thrombo-endarterectomy	38	2,998	1,013	4,011	3,969	-42	-1.0
WISCONSIN							
Procedure:							
Aortic valve replacement	37	$3,891	$3,710	$7,601	$5,389	$-2,212	-29.1%
Mitral valve replacement	31	3,890	3,364	7,254	5,247	-2,007	-27.7
Thrombo-endarterectomy	42	3,962	1,314	5,276	4,765	-511	-9.7

Source: Medicare Part B claims, 1984.

total bills for the procedure, including assistants. The difference between the actual combined costs and the summed costs of the CABG and the other procedure performed separately is calculated in column (5) as a dollar amount, and in column (6) as a percent of the total cost of the separate procedures. For example, when performed separately in Alabama, the CABG costs $2,765 and the aortic valve replacement $2,070, for a total of $4,835. When the two procedures are performed at the same time, the combined cost is $3,899, which is $936 or 19.4 percent less than when each is performed separately.

In Alabama, the "discount" for both valve procedures is approximately 20 percent. This figure is in keeping with the carrier's pricing rule. (Mathematically, with a single bill for each procedure the maximum discount under the carriers' pricing rules would be 25 percent. This maximum value is premised on a situation where both procedures cost the same amount.) However, the discounts for the valve replacements in Wisconsin are between 25 and 30 percent. This result is apparently due to the fact that the charge levels for those specific practices performing the CABGs with other major operations are less than the average charge levels for all practices that are used in columns (1),(2), and (3).

In the case of the thromboendarterectomy, the discounts are much lower, only one percent in Alabama and 9.7 percent in Wisconsin. These lower figures are partly due to the fact that the surgeon performing the endarterectomy is somewhat less likely to be in the same practice as the one performing the CABG. As a result, both the bill submission and the carrier review are less likely to reflect the rules for multiple procedures. For the valve procedures, it is almost always the case that the physician performing the valve replacement is the same (or in the same group) as the one performing the CABG.

5.0 PERMANENT PACEMAKER INSERTIONS

5.1 Overview

The third high volume, high dollar procedure to be evaluated is permanent transvenous pacemaker insertion. The initial analysis shows that pacemaker insertions, with an average Medicare allowed charge of $710 in Wisconsin and $916 in Alabama, do not look expensive when compared with CABGs or lens procedures. Nor are they frequently performed; pacemaker implantation occurs 1.29 times per 1000 eligibles in Wisconsin compared with lens procedures which occur nearly 15 times more frequently. Even CABGs occur nearly three times as frequently.

Attention has been focussed on pacemakers because they are an example of how rapid technology changes may affect the services provided to Medicare beneficiaries. The attention, however, has been primarily on the hospital side where concerns about the way hospitals are reimbursed for the pacemaker device itself have been raised. Recent recommendations to DHHS from the Prospective Payment Commission (ProPAC) propose a restructuring of DRGs into 2 categories: one for cases with a dual chamber device, the A-V sequential, and the other for cases with a single chamber device. The concerns have been that the newer dual chamber (A-V sequential) device is more expensive to hospitals because of the added costs of the device, need for a second lead, and longer operative time.

The following analysis compares Medicare allowed charges for implantation of permanent pacemakers in two states, Alabama and Wisconsin, during 1984. The analysis evaluates the allowed charges for insertion of a permanent pacemaker, both the atrial and ventricular single chamber pacemakers (CPT-4 codes 33206 and 33207) as well as the dual chamber devices (CPT-4 code 33208). In addition to the surgeon's charges for implanting the pacemaker, we will also compare the use of other physician services related to the procedure. The analysis has been restricted to permanent pacemakers because the insertion of a temporary device is often an emergency procedure where the patient may be in critical condition with severe complications. The analysis also focuses on the inpatient charges primarily because relatively little occurs in the 90 days post-insertion.

Before presenting empirical results, the next section describes the typical candidate for pacemaker insertion, the different types of pacemaker devices, who typically performs the insertion and what the procedure entails.

5.2 Clinical Indications For Permanent Pacemaker Insertion

The vast majority of permanent pacemakers are inserted in people 65 years of age or older. Hence, permanent pacemakers are predominantly an issue for the Medicare population. Clinical indications include patients with complete heart block in whom the ventricular rate is too slow and others with unstable ventricular rhythms that put them at risk for syncope (fainting spells) or even sudden death. The purpose of the pacemaker is to electrically stimulate the heart and, hence, to ensure a regular rhythm at a rate sufficient to meet the body's needs.

The initial insertion may occur on an elective admission or may be the consequence of an admission for another purpose; for example, following a myocardial infarction or syncopal episode. In addition, a pacemaker may be inserted prior to major surgery in cases where the heart rate or rhythm may increase the risk of undergoing surgery. Therefore, one needs to know the clinical setting in which the pacemaker insertion takes place in order to fully understand days of hospitalization or use of ancillary services.

5.2.1 Pacemaker Technology

Two basic types of permanent pacemakers are in use today. The first is a ventricular demand pacemaker (VVI). Such a unit stimulates the ventricle directly when the patient's own rhythm (intrinsic rhythm) is not adequate. The second type of pacemaker is the dual chamber unit (DDD); this unit uses two pacer wires, one to stimulate the ventricle and the other to stimulate the atrium. The advantage of the dual chamber pacemaker is that it creates "physiologic pacing" in which the atrium is caused to beat just before the ventricle, as occurs in a normal heart. The benefit is greater cardiac output and reduced likelihood of untoward symptoms that are termed the "pacemaker syndrome". It is not entirely clear how often the pacemaker syndrome occurs to a degree that significantly impedes the quality of life, nor, in such

patients, how often the dual chamber pacemaker relieves these symptoms. Nonetheless, the dual chamber pacemaker is considered to be the "state of the art" and is the predominant unit being used in many medical centers. A third type of device, a single chamber atrial pacemaker which is inserted in the atrium is not frequently used.

Pricewise, the dual chamber pacemaker device itself costs about twice as much as the ventricular demand pacemaker. Cost differentials over time will be even greater because of the shorter "life time" of the pulse generator for the dual chamber unit (5 years versus 10 years).

5.2.2 Insertion Procedure

Usually, the pacemaker insertion is performed under local anesthesia. Sometimes a temporary pacemaker wire has been placed previously to stabilize the patient. Pacer wires are inserted through a cut-down on the superior vena cava (upper chest). If both ventricular and atrial wires are to be used, usually the ventricular wire is placed first. The electrode on the ventricular wire is wedged in the muscle of the right ventricle and that of the atrial wire in the right atrial appendage. The wires are then connected to the pulse generator which is placed in a "pocket" under the skin of the chest. Primary challenges are to achieve secure electrode placement and reliable conduction. This is possible in the vast majority of patients. In a few patients, however, the electrodes may become dislodged or effective pacing is not achieved so that a revision becomes necessary.

On average, insertion of a ventricular pacemaker takes about one hour. The need for an atrial pacing wire with the dual chamber unit adds up to another one-half hour to the procedure time. Post-procedure follow-up time is minimal except in the small proportion of patients who experience an early problem. Often the patient will have his heart rhythm monitored electronically for a day or two after the procedure, either on the open ward or on a CCU.

One or more physicians may be involved in the procedure depending on skills and, perhaps, also on financial incentives. Skills required are those to insert the pacing wire, knowledge of the electronics of the pacer,

and the surgical ability to create the pocket for the pulse generator. One physician can easily perform the entire procedure, though sometimes a cardiologist and surgeon work as a team.

Following successful insertion of the pacemaker, the patient is followed at regular intervals, and the pulse generator is monitored electronically so that battery failures can be anticipated prior to clinical pacing failures.

5.3 Comparison of Medicare Allowed Charges for Pacemaker Insertion

As discussed above, the insertion of a permanent pacemaker is typically performed by a single physician without the services of an assistant; and the physician doing the insertion can also provide the local anesthesia. In the analysis of Wisconsin data, however, we observed an unusual pattern of practice in 11.7 percent of cases: the insertion of a permanent pacemaker with transvenous electrode is unbundled into two discrete components billed by two different physicians. The surgeon is reimbursed for making the "pocket" to accommodate the device, while the cardiologist is reimbursed for the placement of the electrodes only. Since CPT-4 does not have a code for this second component alone, the carrier has adapted the CPT-4 code 33216, "insertion, repositioning, or replacement of the electrode only (15 days or more after initial insertion)", to pay for the initial positioning of the electrode.

Thus for these cases in Wisconsin, we have redefined the allowed charge for pacemaker insertion as the sum of the charges for both physicians involved. For the remaining cases in Wisconsin and for all pacemakers in Alabama, the allowed charge for insertion of a pacemaker is the surgeon's charge.

The distribution of Medicare allowed charges <u>for insertion only</u> differs markedly in the two states. As shown on Table 5-1, the charges in Alabama are tightly distributed overall. The average charge for all pacemakers is $926, the 25th percentile is $880 and the 75th percentile is $1,000. In contrast, the charges in Wisconsin are very widely distributed. The average charge is $710 and it ranges from $477 at the 25th percentile to $840 at the 75th percentile.

TABLE 5-1

DISTRIBUTION OF MEDICARE ALLOWED CHARGES FOR PACEMAKER INSERTION-ALABAMA AND WISCONSIN 1984

Type of Pacemaker	ALABAMA AVERAGE CHARGE	ALABAMA C.V.	WISCONSIN AVERAGE CHARGE	WISCONSIN C.V.	25TH PERCENTILE ALABAMA	25TH PERCENTILE WISCONSIN	50TH PERCENTILE ALABAMA	50TH PERCENTILE WISCONSIN	75TH PERCENTILE ALABAMA	75TH PERCENTILE WISCONSIN
Atrial*	$871	(.16)	$667	(.22)	$850	$450	$900	$721	$950	$829
Ventricular*	955	(.17)	604	(.21)	948	450	996	630	1060	722
A-V Sequential*	958	(.16)	785	(.30)	946	706	956	787	1080	840
All Pacemakers										
Team Procedure			998	(.23)		857		1071		1119
Single MD Procedure			671	(.33)		473		721		829
Total	$926	(.17)	$710	(.34)	$880	$477	$948	$721	$1000	$840

* Excludes charges for team procedure cases in Wisconsin where type of pacemaker is not specified.

Source: Medicare Part B claims for Alabama and Wisconsin, 1984.

The inconsistency in the pattern of allowed charges across states for different types of pacemakers is troubling. Although ventricular pacemakers are more expensive than the atrial devices in Alabama, the opposite is true in Wisconsin. The insertion of an A-V sequential device is more expensive than single chamber devices in both states, but the magnitude of the difference is much smaller in Alabama. This finding calls into question the accuracy of the use of the CPT-4 codes to identify the type of device used. This problem is further compounded by the cases where two physicians insert the pacemaker.

When the insertion of a pacemaker in Wisconsin is done as a team procedure, the type of pacemaker is not specified. Table 5-1 shows the distribution of allowed charges by type of device only for those with one physician performing the insertion. The atrial device with a mean charge of $667 is more expensive than the venticular (mean charge of $604) and its distribution is more skewed. The 25th percentile for each is $450 while the 75th percentile is $100 higher for the atrial device. The A-V device is more expensive (mean charge $785) although the distribution is tighter.

Although it is not possible to determine which type of device was used for the cases where two physicians (team procedure) performed the procedure, the average allowed charge of $998 is substantially higher than that for the remaining cases whose average charge is $671. The distribution is highly skewed for both types of cases. The cases with two physicians have charges of $857 at the 25th percentile and $1,119 at the 75th percentile, while those with one physician had charges of $473 at the 25th percentile and $829 at the 75th percentile. A similar pattern is observed for both the atrial and ventricular pacemakers in Alabama where the difference between the 25th and 75th percentile is around $110. The A-V sequential pacemaker is the most expensive, with a mean charge of $958; the 25th percentile is $946 and the 75th percentile is $1082.

5.4 Use of Different Types of Pacemakers

Which type of device is used most frequently? As shown on Table 5-2, our results show that the atrial pacemaker is the most common device in both states. In Alabama, 44.6 percent of patients receive an atrial pacemaker, while 32.3 percent receive a ventricular pacemaker, and 23.1 percent an A-V

TABLE 5-2

DISTRIBUTION OF TYPE OF PACEMAKER ACROSS ALL SPECIALTIES

Type of Pacemaker	Percent of Cases	
	Alabama (N=1275)	Wisconsin (N=771)
Atrial	44.6%	57.5%
Ventricular	32.3	18.0
A-V Sequential	23.1	13.7
Team Procedure Type Unknown	--	11.7

Source: Medicare Part B claims for Alabama and Wisconsin, 1984.

sequential (dual chamber) device. In Wisconsin, there are 11.7 percent of team procedure cases where the type of device is unspecified; 57.5 percent of patients receive an atrial device, 18 percent a ventricular device, and 13.7 percent an A-V sequential device.

These findings contradict the opinion of cardiologists consulted for the analysis, who believe that the ventricular pacemaker is the most common type of pacemaker in use. This is further evidence that there may be inaccuracies in the CPT-4 procedure coding on the claims submitted to the carriers. Lacking any means of verifying which type of device is inserted, we simply note the difference between what the data show and our experts' opinions.

5.5 Comparison of Utilization of Related Services

The implantation of a permanent pacemaker also entails the provision of other physician services. Tables 5-3 and 5-4 show the average charges by specialty for these related services and their relative frequency. The tables present the charges for components of a "package" of inpatient physician services related to the pacemaker insertion as well as the percentage of cases that receive the service. These services become the basis of the package price discussed in Section 5.7 below. Also included are other common physician services that are provided during the hospital stay but which are not included in the package because they may be unrelated to the pacemaker.

The average charge for pacemaker insertion in Alabama is $926 for all specialties and localities. One third of pacemakers are inserted by general surgeons, another third by thoracic surgeons, while 25 percent of pacemaker procedures are performed by cardiologists. Since the majority are performed by these three specialties, we will compare their costs of the insertion and other related services. Cardiologists are the most expensive with an average allowed charge of $1,035, while thoracic surgeons and general surgeons receive about $150 less on average. Thoracic surgeons who insert a pacemaker bill for repair or revision twice as frequently as general surgeons (4.1% vs 2.6% of cases) while cardiologists almost never do (0.6%). The average allowed charge for repairs is $384 for thoracic surgeons compared with $368 and $298 for cardiologists and general surgeons, respectively.

TABLE 5-3

COMPARISON OF UTILIZATION OF INPATIENT SERVICES RELATED TO PACEMAKER INSERTION-ALABAMA

	General Surgeon (N=469)	Cardio-logist (N=311)	Thoracic Surgeon (N=468)	Other Specialist (N=45)	All Physicians (N=1293)
Pacemaker Insertion*	$893 (100.0)**	$1035 (100.0)	$901 (100.0)	$771 (100.0)	$926 (100.0)
Repair/Revision*	298 (2.6)	368 (0.6)	384 (4.1)	200 (2.2)	348 (2.6)
Anesthesia*	176 (52.2)	175 (28.0)	180 (83.8)	174 (6.7)	178 (56.2)
Asst. Surgeon*	172 (1.3)	--- ---	643 (1.5)	--- ---	425 (1.0)
ECG*	30 (74.6)	31 (69.8)	26 (74.5)	30 (82.2)	29 (74.0)
Electronic Analysis*	38 (6.8)	10 (0.3)	17 (1.3)	39 (2.2)	34 (3.1)
Radiology	74 (92.5)	75 (89.7)	97 (87.2)	56 (88.9)	82 (90.0)
Laboratory	39 (5.8)	50 (7.1)	47 (8.3)	36 (2.2)	45 (7.0)
Visits	285 (94.7)	288 (94.5)	311 (91.9)	219 (91.1)	293 (93.5)
Consults	90 (59.9)	101 (61.4)	98 (62.8)	84 (62.2)	95 (61.4)
Other Surgery	468 (22.8)	584 (22.8)	969 (21.8)	427 (24.4)	670 (22.5)

* Services included in the inpatient pacemaker package (see Table 5-8).
**Relative frequency in parentheses, e.g. 100%.

Source: Medicare Part B claims for Alabama, 1984.

TABLE 5-4

COMPARISON OF UTILIZATION OF INPATIENT SERVICES RELATED TO PACEMAKER INSERTION-WISCONSIN

	SINGLE MD PROCEDURE						
	General Surgeon (N=168)	Cardiologist (N=228)	Thoracic Surgeon (N=126)	Multi-Specialty Group (N=97)	Other Specialist (N=62)	All MDs (N=681)	Team Procedure All MDs (N=90)
Pacemaker Insertion*	$735 (100.0)**	$644 (100.0)	$721 (100.0)	$615 (100.0)	$586 (100.0)	$671 (100.0)	$998 (100.0)
Repair*	394 (13.7)	521 (29.8)	350 (20.6)	490 (26.8)	563 (33.9)	477 (24.1)	422 (5.5)
Anesthesia*	208 (38.1)	163 (16.7)	089 (31.0)	181 (40.2)	215 (16.1)	190 (27.9)	184 (31.1)
Asst. Surgeon*	205 (13.1)	145 (5.7)	--- ---	167 (9.3)	168 (1.6)	180 (6.6)	174 (2.2)
ECG*	28 (73.8)	26 (70.6)	22 (61.1)	27 (60.8)	26 (61.3)	26 (67.4)	24 (71.1)
Electronic Analysis*	35 (1.65)	18 (7.1)	13 (5.3)	66 (0.8)	7 (7.2)	34 (4.5)	--- ---
Radiology	82 (85.1)	76 (81.6)	95 (82.5)	73 (77.3)	66 (79.0)	80 (81.8)	95 (87.8)
Laboratory	27 (7.7)	32 (7.5)	44 (8.7)	34 (13.4)	18 (3.2)	33 (8.2)	58 (13.3)
Visits	387 (83.9)	335 (79.4)	333 (88.9)	349 (85.6)	264 (82.3)	343 (86.9)	376 (94.4)
Consults	113 (52.4)	109 (56.6)	108 (52.4)	101 (48.5)	114 (37.1)	109 (51.8)	106 (65.6)
Other Surgery	494 (25.0)	789 (16.2)	1028 (21.4)	493 (37.1)	910 (17.7)	703 (21.0)	849 (27.8)

Source: Medicare Part B claims for Wisconsin, 1984.

* Services included in the inpatient pacemaker package (see Table 5-8).
** Relative frequency in parentheses, e.g., 100%.

The allowed charges for anesthesia are remarkably similar across specialties (approximately $178), although cases where the pacemaker is inserted by a thoracic surgeon are far more likely to include an anesthesia bill. Although our consultants report that the local anesthesia is sometimes provided by the surgeon inserting the pacemaker, we found that all anesthesia bills were submitted by an anesthesiologist. Assistant surgeons are not usually reimbursed by this carrier for pacemakers, so that only one percent of cases have an assistant.

On average, charges for hospital visits for pacemaker patients are $293 and the differences across specialties are quite small. Similar results are found for consultations, the average charge overall is $95, and 61.4 percent of patients see a consultant during the hospital stay.

About 22 percent of patients in Alabama receiving a pacemaker also have another surgical procedure at some time during the hospital stay. The frequency of another procedure is nearly the same across all specialties but the average charge for this procedure varies widely. In cases where a thoracic surgeon installed the pacemaker, the average cost of the second procedure is $969, compared with $584 and $468 for cardiologists and general surgeons respectively. In reviewing the types of other procedures, we find that 3.1 percent of patients receive a CABG and 4.5 percent receive a valve replacement, expensive procedures typically performed by thoracic surgeons. Cardiac catheterizations are the most frequent second procedure occurring in Alabama, representing 35.4 percent of all second procedures.

On Table 5-4 similar data are shown for Wisconsin by specialty for the single MD procedure and for all team procedures. The average allowed charge for the insertion is substantially higher for the team procedure ($998) than when a single physician inserts the pacemaker ($671.) Specialty differences are also substantial; the allowed charge for general surgeons and thoracic surgeons ($735 and $721, respectively) are significantly higher than that for cardiologists ($644.)

It is striking that Wisconsin physicians are far more likely to bill for components of the pacemaker package then are Alabama physicians. This is particularly true of actual repairs of the pacemaker during the hospital stay. Excluding team procedures where the repair code is re-defined, repairs occur in 24.1 percent of Wisconsin cases, while repairs occur in only 2.6 percent of cases in Alabama.

Repairs include:			Percent of Actual Repairs*
CPT4	33212	Insertion or replacement of pulse generator only	72.5
	33216	Insertion replacement or repositioning of permanent transvenous electrodes only (15 days or more after the initial insertion)	24.5
	33218	Repair of pacemaker; electrodes only	3.0
			100.0

* Excludes cases where team inserts the pacemaker.

The repair or replacement of the pulse generator as the most frequent repair code appearing with a pacemaker insertion appears questionable. These repairs should occur infrequently directly following the insertion. In some cases, the insertion of a pacemaker may follow an unsuccessful attempt to repair an existing device. However we have no way of determining whether that is, in fact, the case.

Assistant surgeons are included in 6.6 percent of the single MD procedures and 2.2 percent of the team procedures, with an average allowed charge of $180 and $174 respectively. General surgeons are far more likely to use an assistant (13.1 percent vs 6.6 percent for all physicians). ECGs, an essential service related to pacemakers, are billed in 67.4 percent of cases with a modest average allowed charge of $26. Electronic analysis used during the stay to detect potential electrical problems with the battery have an average reasonable charge of $34 and occur in 4.5 percent of cases.

On average, pacemaker patients in Wisconsin have charges of $343 for visits during their hospitalization. The distribution of allowed charges for visits across specialties is quite narrow with the exception of the other category ($264). More than half (51.8 percent) of patients receive one or more consultation in the hospital with an average allowed charge of $109.

A significant percentage (21 percent) of pacemaker patients in Wisconsin also have a second procedure during their hospital stay. As in Alabama, the type of procedure ranges from endoscopies (4.2 percent) to CABGs (4.2 percent) and valve procedures (2.4 percent). In Wisconsin, 13.7 percent of cases receive a cardiac catheterization.

5.6 Explaining the Variation in Medicare Allowed Charges

The descriptive statistics in Section 5.3 showing costs of pacemaker insertion suggest that there is a significant amount of variation in allowed charges. The type of device that is inserted is one factor that affects charges. However, Medicare also allows the charge to vary by reasonable charge locality (RCL) and by the specialty of the physician performing the procedure.

Regression analysis allows us to identify the contribution of each of these factors in explaining allowed charges for pacemaker insertion. Reasonable charge locality (RCL) was unavailable for Alabama at the time of analysis. Specialty alone in Alabama explains 17.40 percent of the variation and when type of pacemaker is added, a total of 20.25 percent of the variation is explained. The results for Wisconsin are quite different. Reasonable charge locality (RCL) explains 15.35 percent, and when specialty is added, the R^2 increases to 18.29 percent. Entering variables for the different types of pacemakers used including a dummy variable for team procedure cases where the type of device is not known, increases the R^2 to 45.64 percent. What might explain the remaining variation? Individual physician characteristics affecting his/her profile, including length of time in practice, may explain at least some of the remaining variation.

Physician Specialty

Given the importance of physician specialty in explaining allowed charges, we also present the coefficients of the specialty variables, holding type of pacemaker, RCL, and team procedure (Wisconsin only) constant on Table 5-5. It is important to evaluate specialty effects holding locality (RCL) and type of pacemaker constant in order to avoid any biases that might occur. If, for example, most dual chamber pacemakers are inserted by thoracic surgeons or thoracic surgeons are located mostly in urban areas, the effect of type of pacemaker and locality would be included in the specialty coefficient if RCL and type of pacemaker were not also held constant. By including RCL and type of device, we are assured a purer measure of specialty effects.

TABLE 5-5

COMPARISON OF EFFECTS OF SPECIALTY AND TYPE OF PACEMAKER ON MEDICARE ALLOWED CHARGES[a]

Specialty	Alabama	Wisconsin
Cardiologist	132***	-103***
Thoracic Surgeon	14	73***
Multi-specialty Group	--	-142***
Other Specialties	-103***	-138
Ventricular	53***	-99***
A-V Sequential	57***	39*
Unspecified[b]	--	388***

[a]Holding type of pacemaker and RCL (Wisconsin only) constant. General surgeons inserting an atrial pacemaker are in the intercept.

[b]Cases with team procedure where the type of device is unspecified.

*** Significant at 1% level.
* Significant at 10% level.

Source: Medicare Part B claims for Alabama and Wisconsin, 1984.

In Alabama cardiologists have significantly higher charges than general surgeons. The coefficients shown can be interpreted as the incremental dollar impact of specialty on the allowed charges. The $132 coefficient for cardiologists means, holding type of pacemaker constant, Medicare reimburses cardiologists $132 more than general surgeons for pacemaker insertions. Other specialties, representing only 12 percent of all cases, show charges $103 less than general surgeons. Thoracic surgeons' charges are not significantly different from those of general surgeons. In Wisconsin the results are quite different. Holding RCL, type of pacemaker, and team procedure constant, cardiologists have allowed charges $103 lower those of general surgeons. Only thoracic surgeons receive higher charges than general surgeons ($73), while multispecialty group physicians have allowed charges $142 less than general surgeons.

Type of Pacemaker

The inclusion of the type of pacemaker in Alabama also yields significant coefficients. Ventricular and A-V sequential devices show little difference in charges ($53 and $57); each is more expensive than the atrial pacemaker. The results in Wisconsin however, contradict these findings. The insertion of ventricular pacemakers is $99 less expensive than the atrial device. The A-V sequential devices are more expensive ($38) in Wisconsin. The truly significant finding is that those cases with a team procedure (where the type of device isn't specified) have a coefficient that is highly significant and very large, $388. The contradictory results between the two states concerning the differences between the atrial and venticular devices may be an artifact, given our uncertainty regarding the validity of the coding of the type of device. Nonetheless, the coefficients are statistically significant, and raise questions about the appropriateness of these implied different payment levels.

Reasonable Charge Locality (RCL)

The third factor to be considered in explaining the variation in Medicare reasonable charges is the provider's reasonable charge locality (RCL), a variable which was included only in the analysis of Wisconsin. The coefficients (Table 5-6) on all but two of the RCL variables are very

TABLE 5-6

EFFECT OF REASONABLE CHARGE LOCALITY (RCL) ON MEDICARE ALLOWED CHARGES[a]

Locality	Coefficient
Northern	$ 80
Eau Claire	267***
Madison	111***
Wausau	250***
Oshkosh	97***
Green Bay	-50**
Racine/Kenosha	80***
Southeast	187***
Other RCL	139

[a]Holding specialty and type of pacemaker constant. Milwaukee general surgeons inserting an atrial pacemaker are in the intercept .

*** Significant at 1% level.
** Significant at 5% level.
* Significant at 10% level.

Source: Medicare Part B claims for Wisconsin, 1984.

significant, showing allowed charges different from Milwaukee (the omitted RCL). All RCLs but Green Bay are more expensive than Milwaukee with coefficients varying from $97 in Oshkosh to $267 in Eau Claire, holding specialty and type of pacemaker constant. The size of these coefficients are suprisingly large, especially considering that the average charge state-wide is $710.

5.7 Potential for "Packaging" Pacemakers

The "packaging" of related services is an attractive alternative to policymakers seeking to reduce the provision of unnecessary services to Medicare beneficiares. Pacemaker insertion meets many of the criteria identified as essential for packaging (see Mitchell et al., 1983). Pacemaker insertion is a discrete procedure, provided in the presence of certain well-defined clinical indicators. Although there is some difference of opinion surrounding the use of A-V sequential devices, the single chamber devices are still the most common. The identification of services associated with the insertion is fairly simple. The third criterion may be most important from an operational standpoint: that most procedures are typically provided by a single physician.

The following services have been included in the package price:

- Pacemaker insertion;
- Repair of the pacemaker;
- Anesthesia for insertion and repair;
- Assistant surgeon;
- ECG;
- Electronic analysis of pacemaker.

The average total package cost for these services (Table 5-7) in Alabama is $1,072 and $901 in Wisconsin. The package costs for all specialty groups in Alabama vary by less than $120. In Wisconsin, the specialty groups that account for the majority of procedures, cardiologists and thoracic surgeons have an average package price of $864 and $924, respectively. Coefficients of variation (CVs) are considerably larger than those in Alabama (0.3-0.4 versus under 0.2), reflecting the fact that Wisconsin physicians provide a more heterogeneous service mix (i.e., relatively more pacemaker repairs, assistants at surgery, etc.).

TABLE 5-7

COMPARISON OF TOTAL PACKAGE COSTS FOR PACEMAKER INSERTION BY SPECIALTY

Specialty	Alabama		Wisconsin	
	Mean Charge	C.V.	Mean Charge	C.V.
General Surgeons	1,031	(.18)	947	(.34)
Cardiologist	1,109	(.15)	864	(.28)
Thoracic Surgeon	1,112	(.18)	924	(.29)
Multi-Specialty Group	--	--	902	(.42)
All MDs	$1,072	(.19)	$901	(.33)

Source: Medicare Part B claims for Alabama and Wisconsin, 1984.

6.0 WHAT SHOULD MEDICARE PAY FOR SURGICAL PROCEDURES?

6.1 Measuring "Comparable Worth" in Surgery.

In the preceding three chapters, we examined three surgical procedures whose Medicare payment levels have been identified by HCFA as potentially too high: permanent pacemaker insertion, coronary artery bypass graft (CABG) surgery, and lens procedures. Although these analyses illustrate how differences in practice patterns and billing conventions raise the total costs of surgery, they cannot answer the fundamental question: How do we know that payment levels are, in fact, too high? If cataract extractions alone are reimbursed at two-thirds the rate for one-stage lens procedures, are they underpaid or are the one-stage procedures overpaid? These questions can only be answered by establishing the "comparable worth" of these procedures, i.e., comparing the relative values of different services along a common yardstick.

A relative value scale (or RVS) represents such a measurement tool. Although relative value scales historically have been constructed from physicians' charges, these kinds of scales simply incorporate the existing market distortions.* An alternative is to use an RVS based on the actual resource costs involved in providing each procedure. Hsaio and Stason (1979) have developed a Resource-Based Relative Value Scale (RBRVS) defined as the combination of the following inputs:

(1) Time - including not only the time to perform the procedure itself but also the time associated with pre- and postoperative care;

(2) Complexity - an estimate of the diagnostic and technical skills required to perform the procedure, the physical and mental intensity of the effort, and the degree of stress due to risk to the patient;

(3) Opportunity costs of specialty training - the amortized value of the opportunity costs associated with residency; and

(4) Physician practice costs - including malpractice premiums as well as rent, wages, equipment, etc.

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* Although fee schedules can be developed from an RVS, the RVS itself is not a fee schedule.

Adjustment for the complexity of the procedure recognizes that an hour of a physician's time performing delicate neurosurgery is not equivalent to the same physician hour spent in a routine office visit. Although derived from subjective self-reports by physicians, Hsaio and Stason found remarkable consistency in the relative estimates of complexity for procedures across physicians.

The original developmental work on RBRVS was extended in a second study by Hsaio et al. (1985) to include a wider range of procedures and data from a larger sample of physicians. Estimates of time and complexity for approximately 100 procedures were obtained from the 110 Massachusetts physicians interviewed, and then validated through a modified Delphi survey of the participants and representatives from all the specialty boards. Practice costs and opportunity costs of specialty training were obtained from secondary sources. Relative values from the resultant RBRVS ranged from 0.07 for a follow-up visit to a family practitioner for hypertension management to 8.63 for a total cystectomy and ileal loop urinary diversion, a 123-to-1 difference.

We have taken the RBRVS values from the Hsiao study and used them in our evaluation of potential overpayment of high volume Medicare procedures. Unfortunately, the one-stage lens procedure was not included in the Hsaio study, although values were obtained for the two independent operations. After talking with two local ophthalmologists, we assigned an RBRVS value to one-stage lens procedures of 1.10 times the value for cataract extraction alone. This was based on their expert judgement that the one-stage lens procedure took at most an additional 5 minutes to perform (extraction alone takes 45 minutes), and that the complexity of the two steps was the same.

How valid is the Resource-Based RVS for purposes of our study? The values are based on estimates provided by a relatively small number of physicians, all located within a single state. The single state location of study physicians will bias the results only if we believe that operating room times or perceived complexity are different in Massachusetts than in other parts of the country. There is no reason to believe this is the case, although certainly national data would be preferable. More important is the number of study physicians; larger sample sizes (particularly within specialty) would give us more confidence in the stability of the time and complexity estimates. Despite these very real limitations, the Resource-Based RVS can provide useful guidance on the "comparable worth" of different

surgical procedures. It should also be noted that Hsaio and his colleagues (under HCFA grant) are currently in the process of replicating their study on a large national sample of physicians. Thus, we will eventually have the opportunity of validating our analyses with a more definitive RBRVS.

6.2 Potential Medicare Payments Under a Resource-Based RVS

Table 6-1 compares 1984 Medicare reasonable charges for 31 surgical procedures with what their payments would be under the Resource-Based RVS. These procedures were chosen to represent a range of surgical specialties and high volume Medicare operations.* Reasonable charges based on a weighted average for all operations in our four states are displayed in column 1. The second column displays the relative values from the Hsaio RBRVS study. To transform reasonable charges into payments reflecting the actual resources involved, we selected one procedure to serve as the base or index value. Typically, a routine office visit is used for this purpose. We chose not to do this for two reasons: (1) the greatest criticism of the RBRVS has been the reliability of comparisons across surgical and nonsurgical procedures; and (2) the scope, content, and payment level of office visits varies significantly by specialty.** Instead, we chose a cholecystectomy without common duct exploration (the first listed procedure in the table) to serve as the base. Although any selection is arbitrary, cholecystectomy was chosen because it is a common operation for both Medicare and non-Medicare patients, it has been performed for years, and there have been relatively few technological changes in the procedure itself. (In the subsequent section, we examine the sensitivity of our results to the selection of the index procedure.)

The potential payment under a Resource-Based RVS is then calculated for each procedure as the cholecystectomy charge times the RBRVS value for the procedure in question divided by the cholecystectomy RBRVS value, or

*Although additional operations were included in the Hsaio study, there were either insufficient observations in our claims data or they could not be precisely matched with CPT-4 procedure codes.

**This problem may be less serious when comparisons are limited to a single specialty. We explore this in Section 6.4 below.

TABLE 6-1

COMPARISONS OF CURRENT MEDICARE CHARGES AND POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS

31 procedures

	Medicare Reasonable Charge[a]	RBRVS Value[b]	Resource-Based Payment[c]	Percent Change
Cholecystectomy (index procedure)	$704	2.01	$704	0.0%
Diagnostic colonoscopy	278	0.73	256	-7.9
Inguinal hernia repair	465	0.98	343	-26.2
Tracheostomy	288	0.83	291	+1.0
Modified radical mastectomy	876	2.56	897	+2.4
Esophogogastrectomy	1,727	6.01	2,105	+21.9
Total abdominal hysterectomy	825	1.88	658	-20.2
Diagnostic D & C	222	0.48	168	-24.3
Laparoscopy	362	0.63	221	-39.0
Diagnostic cystourethroscopy	87	0.25	88	+1.1
Transurethral resection of medium bladder tumor	600	1.04	364	-39.3
Ureterolithotomy	923	2.09	732	-20.7
Total cystectomy with urinary diversion	1,695	8.63	3,023	+78.3
Transurethral resection of the prostate	1,013	1.85	648	-36.0
Suprapubic prostatectomy	1,086	2.05	718	-33.9
Total hip replacement	2,040	3.21	1,124	-44.9
Decompression of carpal tunnel	440	0.72	252	-42.7
Reduction of wrist fracture	277	0.79	277	0.0
Femoral fracture with open treatment & internal fixation	1,105	2.75	963	-12.9
Lumbar laminectomy	1,400	2.04	715	-48.9
Permanent pacemaker insertion	854	1.49	522	-38.9
Lung Lobectomy	1,428	4.16	1,457	+2.0
Insertion of intra-aortic balloon pump	433	1.02	357	-17.6
Mitral valve replacement	2,702	6.52	2,284	-15.5
Coronary artery bypass graft, three arteries	3,666	7.05	2,469	-32.7
Peripheral iridectomy for glaucoma	561	0.74	259	-53.8
Laser photocoagulation for retinopathy	499	0.79	277	-44.5
Lens extraction, intracapsular	987	1.37	480	-51.4
Extraction with intraocular lens insertion (one-stage procedure)	1,444	1.51[d]	529	-63.4
Intraocular lens insertion only	939	1.36	476	-49.3
Scleral buckling for retinal detachment	1,403	2.43	851	-39.3

[a] Average charges calculated with 1984 Part B claims from Alabama, Connecticut, Washington and Wisconsin.

[b] Obtained from Hsiao et al., 1985.

[c] Estimates based on formula: $704*(RBRVS/2.01).

[d] Estimate derived by authors, extrapolating from the RBRVS value for lens extraction alone.

$704*(RBRVS/2.01). These resource-based payments are shown in column 3. The fourth and final column in Table 6-1 displays the percent change in Medicare reimbursement that would result (col.3-col.1/col.1). This approach assumes, of course, that reimbursement for the base procedure, cholecystectomy, is reasonable given the time, skill, etc., required to perform it. However, many researchers including Hsaio-Stason, have argued that virtually all surgical procedures are overpaid relative to nonsurgical procedures (i.e., the so-called "cognitive services"). If so, then our estimates of potential RBRVS payments are conservative and the percent changes are underestimated.

Relative to cholecystectomy, all but six of the surgical procedures on Table 6-1 are significantly "overpaid".* Under a resource-based approach, allowed charge levels for pacemaker insertion would be reduced by 39 percent, coronary artery bypass graft surgery by 33 percent, and one-stage lens procedures by 63 percent. "Roll-backs" of similar magnitude would take place for other high volume, high dollar Medicare procedures. Total hip replacements would be paid 45 percent less than currently, and TURPs 36 percent less.

Table 6-1 also suggests that newer, more technology-intensive procedures are paid at disproportionately higher levels relative to their costs, even when compared with other procedures performed by the same specialty. Consider the two cardiac surgeries, for example. CABG surgery involving three arteries is only 8 percent more resource-intensive than mitral valve replacement but is reimbursed at a rate 36 percent higher. Similarly, scleral buckling for retinal detachment is 79 percent more "costly" to perform than one-stage lens procedures, but ophthalmologists are actually paid less for it. The impact of resource-based payment thus would be to restore interprocedure equity even within a specialty. We make further within-specialty comparisons in Section 6.4 below, using one of each specialty's own procedures as the index.

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*Resource-based payment for mastectomy, lung lobectomy, tracheostomy, and cystourethroscopy would increase only slightly over current levels, while that for esophogogastrectomy would increase 22 percent. Although esophogogastrectomy is not a common Medicare operation, we included it here for comparison with mitral value replacement and CABG because its RBRVS valve approaches those for the two cardiac surgeries, yet it is performed by general surgeons. Most dramatic is the potential increase for total cystectomy with urinary diversion: 78.3 percent. Although more resource-intensive than CABG surgery (RBRVS=8.63 versus 7.05), urologists are only paid half as much for this procedure as their thoracic surgery colleagues are for the much more common CABG operation.

Even though the percent reductions shown in column 4 appear quite large, the absolute magnitude of potential payment changes are still probably underestimated, for several reasons. First, as discussed earlier, calculation of the resource-based payments are predicated on the premise that cholecystectomies are reimbursed appropriately. To the extent that cholecystectomies are also overpaid, then our resource-based payments are too high and the percent reductions too low. Second, no adjustments have been made in the Medicare reasonable charges shown to account for two-physician surgeries. Yet a second surgeon (billing separately as either a "team" physician or an assistant) was present in many of the CABG operations, pacemaker insertions, and lens procedures we analyzed in the preceding three chapters. In these cases, actual total surgical charges are substantially higher. Third, the RBRVS values produced by Hsiao et al. assume that a single surgeon performs the entire procedure and delivers all pre- and postoperative care. Resource costs include the opportunity cost of specialty training, and the RBRVS methodology also assumes that a fully qualified surgeon is personally involved throughout the time period. To the extent that a resident or non-physician technician substitutes for the surgeon, the RBRVS value for that procedure will be overstated.

6.3 Sensitivity of RBRVS Payments to the Choice of Index Procedure

The large potential payment reductions shown in the preceding section were based on the use of cholecystectomy as the index procedure. How sensitive are our results to our choice of index procedure? Table 6-2 compares resource-based payments, using two other surgical operations as index procedures: inguinal hernia repair and lung lobectomy. Inguinal hernia repair is a common procedure for general surgeons, but simpler to perform than cholecystectomy (relative value of 0.98 compared with 2.01). Lung lobectomy is considerably more complex (RBRVS = 4.16) and usually performed by thoracic surgeons. Both operations are of long-standing with few technological changes in the procedures themselves.

The first two columns of Table 6-2 are identical to the last two in Table 6-1 (columns 3 and 4), and are reproduced here for ease of comparison. The third column displays resource-based payments, using hernia repair as the index, and the fourth column shows the percent change in Medicare

TABLE 6-2

SENSITIVITY OF RESOURCE-BASED PAYMENTS TO CHOICE OF INDEX PROCEDURE

	Resource-Based Payment with Cholecystectomy as Index[a]	Percent Change with Cholecystectomy as Index	Resource-Based Payment with Hernia Repair as Index[b]	Percent Change with Hernia Repair as Index	Resource-Based Payment with Lung Lobectomy as Index[c]	Percent Change with Lung Lobectomy as Index
Cholecystectomy	$704	0.0%	$954	+35.5%	$690	-2.0%
Inguinal hernia repair	343	-26.2	465	0.0	336	-27.7
Lung Lobectomy	1,457	+2.0	1,974	+38.2	1,428	0.0
Transurethral resection of the prostate	648	-36.0	878	-13.3	635	-37.3
Suprapubic prostatectomy	718	-33.9	973	-10.4	704	-35.2
Total hip replacement	1,124	-44.9	1,523	-25.3	1,102	-46.0
Femoral fracture with open treatment and internal fixation	963	-12.9	1,305	+18.1	944	-14.6
Permanent pacemaker insertion	522	-38.9	707	-17.2	511	-40.2
Coronary artery bypass graft, three arteries	2,469	-32.7	3,345	-8.8	2,420	-34.0
Lens extraction, intracapsular	480	-51.4	650	-34.1	470	-52.4
Extraction with intraocular lens insertion (one-stage procedure)[d]	529	-63.4	716	-50.4	518	-64.1
Intraocular lens insertion only	476	-49.3	645	-31.3	467	-50.3

[a] Estimates based on formula: $704*(RBRVS/2.01).

[b] Estimates based on formula: $465*(RBRVS/0.98).

[c] Estimates based on formula: $1,428*(RBRVS/4.16).

[d] Estimate derived by authors, extrapolating from the RBRVS value for lens extraction alone.

reimbursement that would result. Similar results for lung lobectomy are shown in the final two columns. Resource-based payments are presented here only for 12 procedures, the three index procedures and nine other high-volume Medicare operations. Readers interested in comparing resource-based payments for the other procedures shown in Table 6-1 may easily do so using the formulas at the bottom of Table 6-2.

The magnitude of payment reductions are diminished when hernia repair is used as the index. Resource-based payments for two procedures would actually exceed current Medicare allowed charges: femoral fracture and cholecystectomy itself. (Payments for lung lobectomy would increase, regardless of whether cholecystectomy or hernia repair is used.) Allowed charges for all other procedures shown would be reduced, albeit by a somewhat smaller amount. Pacemakers would be paid 17 percent less than currently, for example, CABGs 9 percent less, and one-stage lens procedures 50 percent less.

The use of lung lobectomy as an index procedure would produce resource-based payments virtually identical to those based on cholecystectomy. The magnitude of payment reductions would be somewhat larger, but negligibly so. This happens because both the current Medicare reasonable charge and the RBRVS value for lung lobectomy are double those for cholecystectomy. Whether this reflects "real" historical resource costs or is a happy coincidence of data is impossible to say. Cholecystectomy, on the other hand, is about twice as resource-intensive as hernia repair, but is currently paid only 51 percent more.

While it is clear from Table 6-2 that precise payment levels will vary as a function of the index procedure selected, the direction of payment change is generally consistent. Regardless of the index procedure used, prostatectomies (both transurethral and suprapubic), hip replacements, pacemaker insertions, CABG surgery, and lens procedures would all appear to be substantially "overpaid". These surgeries alone account for 17 percent of all operations performed on the elderly (NCHS, 1985).

6.4 Payments Based on Specialty-Specific RBRVS

One potential criticism of the RBRVS in its current state of development is the cross-procedure comparability of estimates provided by physicians in different specialties. Although all physicians who participated in the Hsaio study used the same surgical procedure (appendectomy with value equal to 1.0) to "ground" their estimates, physicians were otherwise asked to report time

and complexity estimates only for procedures commonly performed by their specialty. Despite the appendectomy cross-walk and subsequent validation by Delphi panels, it is still possible that two procedures with similar RBRVS values done by different specialists are not truly equivalent. (For example: are cholecystectomy with a value of 2.01 where time/complexity estimates were provided by general surgeons, and lumbar laminectomy with a value of 2.04 based on estimates from orthopedic surgeons truly equivalent?)

To eliminate this potential source of bias, we also analyzed potential resource-based payments for individual surgical specialties, using one of that specialty's procedures as the index. In addition, we include an office visit for each specialty as well. Problems with comparability of surgical operations and visits should be minimized when all estimates are derived from the same physicians in the same specialty.

Table 6-3 displays six orthopedic surgery procedures. The Medicare reasonable charges and RBRVS values are the same as those shown in Table 6-1. The Medicare charge for the initial (new patient) comprehensive office visit is based on reasonable charges for orthopedic surgeons only. The RBRVS value is based on the average of the values for the two visit categories included in the Hsaio study.* The third column of Table 6-3 shows resource-based payments for orthopedic procedures, using a femoral fracture (a common and technologically stable procedure) as the index, with the resulting change in Medicare reimbursement displayed in column 4. The last two columns present similar calculations, based on the visit as the index procedure. Relative to a femoral fracture, three of the remaining four surgical procedures are "overpaid." Under the resource-based approach, allowed charge levels for lumbar laminectomy would be reduced by 41 percent, decompression of the carpal tunnel by 34 percent, and total hip replacements by 37 percent. By contrast, wrist fracture would be paid 14 percent more and comprehensive office visits 2 1/2 times as much as they are currently.

If a comprehensive office visit is used as the index, on the other hand, orthopedic procedures would be reimbursed at only a fraction of what they are now. Based on estimates from orthopedic surgeons in the Hsaio study, a total hip replacement is considered to be about ten times more "costly" than an

*Unfortunately, unlike the surgical procedures, the office visit descriptions included in the Hsaio study do not correspond to CPT-4 codes. We chose to use a comprehensive visit by a new patient as the best available proxy. Since the reported RBRVS values are very similar (within 0.03 of each other), a simple average should not introduce any undue bias.

TABLE 6-3

POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR ORTHOPEDIC SURGEONS

	Medicare Reasonable Charge[a]	RBRVS Value[b]	Resource-Based Payment with Femoral Fracture as Index[c]	Percent Change with Femoral Fracture as Index	Resource-Based Payment with Office Visit as Index[d]	Percent Change with Office Visit as Index
Femoral fracture with open treatment & internal fixation	$1,105	2.75	$1,105	0.0%	$308	-72.1%
Lumbar laminectomy	1,400	2.04	820	-41.4	229	-83.6
Decompression of carpal tunnel	440	0.72	289	-34.3	81	-81.6
Reduction of wrist fracture	277	0.79	317	+14.4	89	-67.9
Total hip replacement	2,040	3.21	1,290	-36.8	360	-82.4
Initial comprehensive office visit	37	0.33	133	+259.5	37	0.0

[a] Average charges calculated with 1984 Part B claims from Alabama, Connecticut, Washington and Wisconsin.

[b] Obtained from Hsiao *et al.*, 1985.

[c] Estimates based on formula: $1,105*(RBRVS/2.75).

[d] Estimates based on formula: $37*(RBRVS/0.33).

orthopedic office visit. This implies a resource-based payment of $360 for a total hip replacement, or less than one-fifth of what Medicare currently allows. Of course, this payment level assumes that reimbursement for the base procedure (the office visit) is in fact reasonable, a point of much debate by physicians in all specialties.

Table 6-4 presents potential resource-based payments for thoracic surgeons, using mitral valve replacement (an open-heart operation of long-standing) as the index procedure. This table, like that for orthopedic surgeons and like those that follow for urologists and ophthalmologists, repeats a familiar theme; it is the high volume Medicare operations that appear to be most "overpaid." Relative to mitral valve replacement, payments for pacemaker insertion should be reduced 28 percent and CABG surgery by 20 percent. Current reimbursement levels for insertion of intra-aortic balloon pump seem about right, on the other hand, while lung lobectomy and tracheostomy should be paid more.

Tables 6-5 and 6-6 show similar results for urologists and ophthalmologists, respectively. The two most frequent Medicare operations (prostatectomies and lens procedures) still appear to be substantially "overpaid," even when compared to specialty-specific index procedures. Resource-based payments for TURPS, relative to ureterolithotomy, imply a 19 percent reduction from current Medicare payment levels, while when indexed to laser photocoagulation, payments for one-stage lens procedures would be lowered by 34 percent. Interestingly, the most "costly" procedures to perform appear to be underpaid. A Resource-Based RVS for ophthalmologists would increase reimbursement for scleral buckling nine percent, while a similar RBRVS would more than double what urologists are currently compensated for a complete cystectomy with urinary diversion.

6.5 Implications for Medicare Payment Reform

Our results suggest that the Medicare program is paying far more for many surgeries than their resource costs would justify. Included among "overpriced"" procedures are such high volume, high dollar Medicare operations as lens procedures, CABGs, pacemaker insertions, TURPs, and total hip replacements. Although we have studied only a small subset of procedures, the 31 procedures shown in Table 6-1 account for over one-fourth of all surgical

TABLE 6-4

POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR THORACIC SURGEONS

	Medicare Reasonable Charge[a]	RBRVS Value[b]	Resource-Based Payment with Mitral Valve Replacement as Index[c]	Percent Change with Mitral Valve Replacement as Index	Resource-Based Payment with Office Visit as Index[d]	Percent Change with Office Visit as Index
Mitral valve replacement	$2,702	6.52	$2,702	0.0%	$519	-80.8%
Lung Lobectomy	1,428	4.16	1,724	+20.7	331	-76.8
Insertion of intra-aortic balloon pump	433	1.02	423	-2.3	81	-81.3
Tracheostomy	288	0.83	344	+19.4	66	-77.1
Permanent pacemaker insertion	854	1.49	617	-27.8	119	-86.1
Coronary artery bypass graft, three arteries	3,666	7.05	2,922	-20.3	561	-84.7
Initial comprehensive office visit	43	0.54	224	+420.9	43	0.0

[a] Average charges calculated with 1984 Part B claims from Alabama, Connecticut, Washington and Wisconsin.

[b] Obtained from Hsiao et al., 1985.

[c] Estimates based on formula: $2,702*(RBRVS/6.52).

[d] Estimates based on formula: $43*(RBRVS/0.54).

TABLE 6-5

POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR UROLOGISTS

	Medicare Reasonable Charge[a]	RBRVS Value[b]	Resource-Based Payment with Ureterolithotomy as Index[c]	Percent Change with Ureterolithotomy as Index	Resource-Based Payment with Office Visit as Index[d]	Percent Change with Office Visit as Index
Ureterolithotomy	$923	2.09	$923	0.0%	$163	-82.3%
Diagnostic cystourethroscopy	87	0.25	110	+26.4	20	-77.0
Transurethral resection of medium bladder tumor	600	1.04	459	-23.5	81	-86.5
Transurethral resection of the prostate	1,013	1.85	817	-19.3	144	-85.8
Suprapubic prostatectomy	1,086	2.05	905	-16.7	160	-85.3
Total cystectomy with urinary diversion	1,695	8.63	3,811	+124.8	674	-60.2
Initial comprehensive office visit	32	0.41	181	+465.6	32	0.0

[a] Average charges calculated with 1984 Part B claims from Alabama, Connecticut, Washington and Wisconsin.

[b] Obtained from Hsiao *et al.*, 1985.

[c] Estimates based on formula: $923*(RBRVS/2.09).

[d] Estimates based on formula: $32*(RBRVS/0.41).

TABLE 6-6

POTENTIAL PAYMENTS UNDER A RESOURCE-BASED RVS FOR OPHTHALMOLOGISTS

	Medicare Reasonable Charge[a]	RBRVS Value[b]	Resource-Based Payment with Laser Photocoagulation as Index[c]	Percent Change with Laser Photocoagulation as Index	Resource-Based Payment with Office Visit as Index[d]	Percent Change with Office Visit as Index
Laser photocoagulation for retinopathy	$499	0.79	$499	0.0%	$60	-88.0%
Peripheral iridectomy for glaucoma	561	0.74	467	-16.8	56	-90.0
Lens extraction, intracapsular	987	1.37	865	-12.4	104	-89.5
Extraction with intraocular lens insertion (one-stage procedure)	1,444	1.51[e]	954	-33.9	115	-92.0
Intraocular lens insertion only	939	1.36	859	-8.5	103	-89.0
Sceral buckling for retinal detachment	1,403	2.43	1,535	+9.4	185	-86.8
Initial comprehensive office visit	35	0.46	291	+731.4	35	0.0

[a] Average charges calulated with 1984 Part B claims from Alabama, Connecticut, Washington and Wisconsin.

[b] Obtained from Hsiao *et al.*, 1985.

[c] Estimates based on formula: $499*(RBRVS/0.79).

[d] Estimates based on formula: $35*(RBRVS/0.46).

[e] Estimate derived by authors, extrapolating from the RBRVS value for lens extraction alone.

operations performed on the elderly (NCHS, 1985). Thus, reducing Medicare payments for even some of these operations could produce considerable cost-savings. The potential Medicare savings suggested by our analyses must be considered illustrative, however. The Resource Based RVS was constructed on a relatively small number of Massachusetts physicians, and future work with a larger, national sample could alter the relative values, at least for some of the procedures. In addition, the actual size of any savings will be critically dependent on the choice of index procedure. Nevertheless, our estimates of potential RBRVS payments are probably conservative, since we used technologically stable surgical operations as index procedures.

Because of the dependence of many physicians on these high volume procedures, such reductions could have substantial effects on their total Medicare revenues. Even if reimbursement for other eye surgery remained unchanged, for example, ophthalmologists could face potential reductions of 25 to 35 percent in their Medicare receipts (based upon Table 2-10).

The most important factor for policymakers to recognize when considering these potential payment reductions is the impact on beneficiaries. So long as physicians may continue to refuse assignment, beneficiaries will be unprotected from potentially large increases in liability. Based on the average Medicare reasonable charge shown in Table 6-1, the patient undergoing a lens procedure must currently pay $289 (0.20*$1,444), and more if the ophthalmologist does not accept assignment. Under resource-based payment, the beneficiary's cost-sharing is reduced to $106 (0.20*$529), but the potential non-assigned liability is enormous, $915 ($1,444-$529), for a total out-of-pocket payment of $1,021. Of course, we do not know how many ophthalmologists would refuse assignment and actually bill the patient for the difference, nor do we know how many patients would be willing and able to pay such a sum. Nevertheless, substantial disruptions in the treatment process are apt to occur in the short-run, unless beneficiaries are protected.

One obvious response is to introduce more financial incentives for physicians to sign Medicare Participating Physician Agreements, e.g., set a higher allowed charge for participating physicians. The absolutely large volume of many of these surgical procedures, coupled with Medicare's large market share, suggests that a Preferred Provider arrangement might also be an appropriate solution. Medicare could set fee levels and establish a list of preferred providers willing to accept that fee as payment-in-full. Beneficiaries would then be required to use those providers in order to receive Part B coverage for the procedure, but would be protected from excessive balance billing liability.

APPENDIX A
TABLES

TABLE A-1

WHAT DO CARDIOLOGISTS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	8.4%	10.6%	10.0%	5.4%
Hospital Visits	21.0	16.8	13.0	12.9
Consultations	6.9	7.5	5.6	7.1
ICU Visits	1.2	5.2	2.3	2.1
Other Visits	3.2	1.0	2.0	2.8
Pacemaker Insertion	2.4	3.1	2.8	1.3
Cardiac Catheterization	23.6	8.6	12.9	15.4
Other Surgery	5.6	21.5	7.9	0.2
ECGs	10.4	9.3	14.3	16.6
Electronic Analysis of Pacemakers	3.1	2.5	0.7	1.2
Echocardiography	6.1	2.4	4.6	2.3
Other Tests	8.7	10.7	19.3	27.1
Other X-rays	0.1	a	1.6	0.9
Assistance at Surgery	a	1.9	2.1	0.7
Total $ (millions)	$13.6	$20.3	$11.9	$12.3

[a] Frequency less than 0.05 percent.

Source: Medicare part B claims, 1984.

TABLE A-2

WHAT DO GENERAL AND FAMILY PRACTITIONERS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	31.0%	37.1%	38.3%	25.5%
Hospital Visits	33.0	29.1	16.2	32.4
Nursing Home Visits	3.5	14.3	5.4	6.8
Emergency Room Visits	4.5	0.0	5.3	0.4
Other Visits	3.3	7.0	3.2	6.3
ECGs	2.4	3.1	4.1	2.0
Other Tests	11.1	4.2	9.3	10.3
X-Rays	3.9	2.2	5.4	3.7
Surgery	6.5	2.6	7.4	7.2
Total $ (millions)	$30.5	$11.9	$32.0	$31.0

Source: Medicare Part B claims, 1984.

TABLE A-3

WHAT DO INTERNISTS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	24.0%	32.1%	27.8%	20.2%
Hospital Visits	38.9	34.3	25.6	33.1
ICU Visits	0.9	2.6	1.3	2.4
Nursing Home Visits	1.4	6.6	2.1	2.9
Other Visits	2.7	3.4	3.0	4.8
Consultations	3.9	3.9	5.1	4.8
Surgery	5.2	3.7	8.5	7.1
ECGs	6.9	5.5	5.5	4.3
Other Tests	12.2	5.2	15.0	14.7
X-Rays	1.7	2.4	4.3	4.2
Total $ (millions)	$40.8	$35.3	$42.8	$56.2

Source: Medicare Part B claims, 1984.

TABLE A-4

WHAT DO ORTHOPEDIC SURGEONS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	7.2%	11.2%	6.5%	6.0%
Hospital Visits	4.7	5.0	1.5	2.5
Consultations	1.5	2.0	1.8	1.8
Arthroplasty;Prosthesis	3.6	4.8	0.3	2.5
Total Hip Replacement, simple	8.5	11.8	13.5	13.4
Total Hip Replacement, complex	3.5	0.7	1.7	1.1
Femoral Fracture with Internal Fixation	14.8	11.3	18.0	15.9
Total Knee Replacement	7.1	6.3	9.6	9.9
Other Surgery	35.6	31.0	33.2	35.5
X-Rays	9.5	10.0	8.1	7.1
Assistance at Surgery	2.7	3.0	5.1	3.0
Total $ (millions)	$14.2	$14.7	$17.5	$19.7

Source: Medicare Part B claims, 1984.

Table A-5

WHAT DO THORACIC SURGEONS DO? (Percent of Medicare Revenues)

	Alabama	Connecticut	Washington	Wisconsin
Office Visits	1.1%	2.0%	1.2%	0.3%
Hospital Visits	2.1	3.7	0.9	0.8
Consultations	1.4	3.7	1.2	0.9
Pacemaker Insertions	3.9	6.6	3.0	1.1
CABGs	45.0	23.0	42.1	57.8
Thromboendarterectomy	6.0	3.9	2.1	1.9
Other Surgery	31.7	52.3	34.7	33.4
Assistance at Surgery	4.1	1.54	10.3	1.8
Total $(millions)	$11.3	$3.1	$4.5	$10.1

Source: Medicare Part B claims, 1984.

APPENDIX B
TABLES

Table B-1

MEDICARE DEPENDENCE OF CARDIOLOGY PRACTICES PERFORMING CARDIAC CATHETERIZATIONS

	Alabama	Connecticut	Washington	Wisconsin
Percent of Practices Performing Procedure	36.8%	72.9%	59.2%	62.0%
Average Medicare Revenues From Procedure[a]	$76,074	$18,075	$26,414	$25,251
Percent of Medicare Revenues From Procedure[a]	26.9%	14.5%	18.1%	22.5%

[a] Based on those practices performing the procedure only.

Source: Medicare Part B claims, 1984.

Table B-2

MEDICARE DEPENDENCE OF ORTHOPEDIC SURGERY PRACTICES PERFORMING TOTAL HIP REPLACEMENTS[a]

	Alabama	Connecticut	Washington	Wisconsin
Percent of Practices Performing Procedure	71.0%	74.3%	75.8%	81.2%
Average Medicare Revenues From Procedure[b]	$19,620	$14,823	$15,748	$14,667
Percent of Medicare Revenues From Procedure[b]	13.6%	13.0%	15.8%	15.2%

[a] Includes both simple and complex relacements and assistants at those operations.

[b] Based on those practices performing the procedure only.

Source: Medicare Part B claims, 1984.

Table B-3

MEDICARE DEPENDENCE OF UROLOGY PRACTICES PERFORMING PROSTATECTOMIES

	Alabama	Connecticut	Washington	Wisconsin
Percent of Practices Performing Procedure	83.5%	90.2%	83.0%	89.9%
Average Medicare Revenues From Procedure[a]	$51,064	$44,451	$41,751	$55,245
Percent of Medicare Revenues From Procedure[a]	36.0%	38.0%	37.6%	43.3%

[a] Based on those practices performing the procedure only.

Source: Medicare Part B claims, 1984.

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